ENVIRONMENT PROGRAMME IN INDIA

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Environmental status and trends

Introduction

Environmental protection and the conservation of natural resources emerged as key national priorities in India following the Stockholm Conference on Human Environment in 1972. Between the Stockholm Conference and the Rio Summit in 1992, India has been able to draw up policies for environmental protection and natural resource conservation in the country. India's commitment to the environment at the international level is shown by the fact that it is a contracting party to many global conventions on the environment and natural resources.

Given the environmental picture, the government will have to accomplish even more in the future than it has in the past, and do so in a tight fiscal environment. Clear priorities and effective strategies will be essential to maximize the sustainable development impact of the budget resources available. The priorities of the government of India are reflected mainly in the form of policy statements on Forestry, on Pollution Abatement, and also through the comprehensive National Conservation Strategy and Policy Statement on Conservation and Development. However, there is a poor understanding of what the concerns and priorities are of other stakeholders who also share the goal of environmental protection. While some amount of consensus building is possible and desirable, there will always be areas of disagreement. A brief description of the state of the environment is presented below (TERI, 1996).

Water resources and quality

Perhaps the most significant environmental problem and threat to public health in both rural and urban India, today, is inadequate access to clean drinking water and sanitation facilities. According to official reports, by early 1993, 42.9 percent of urban India and an abysmally low 3.5 percent of rural India had sanitation facilities available to them. Potable water statistics for the same time period are better than the sanitation statistics, but nevertheless suggest that the Indian government re-examine its water-management policies. Of the urban population, 84.9 percent had access to clean drinking water in 1993 as compared to 69 percent in 1985, but for the rural population the figures fell from 82 percent in 1985 to 78.4 percent in 1993 (World Resources Institute, 1995)

Pressure on water resources

Agriculture consumes nearly 85% of the available water resources. According to water demand projections, water required for use in the agricultural sector is expected to rise from 46 Mham in 1990 to about 85.5 Mham in 2025. At present, there is a wide variation in the irrigation intensity across India. The states of Haryana and Punjab, often seen as the agricultural basket of India, are most dependent on irrigation – over 60 percent of all crop area is irrigated.

In addition to agriculture, the domestic and industrial sectors are also expected to experience a 3-fold and 2-fold increase, respectively, in water demand by 2025 (Shah, 1987). To meet these and other requirements, the Government of India urgently needs to look into the pricing of water, water regulating policies and legislation, institutional support for water resource development, tax recovery, and the increasing gap between water potential created and utilized.

Status of water resources

The adequacy of water availability can be categorized using a "water stress index" (Falkenmark and Widstrand, 1992). This index based on the minimum per capita level of water required to maintain an adequate quality of life in a moderately developed arid zone country. A region whose renewable fresh water availability is below 1700 cubic metres/capita/annum is a 'water stress' region, and one whose availability falls below 1000 cubic metres/capita/annum experiences chronic 'water scarcity'. At present, several parts of India are classified as water stressed, for example, regions in the Indus, Krishna, Mahi, and Ganga sub-basins. Furthermore, a few parts of India are water scarce, namely, the regions under east flowing rivers between Pennara and Kanyakumari, between Mahanadi and Pennar, Cauvery, etc. As per these indicators, India as a whole may face severe water stress by 2025 with a per capita availability of only 1389 cubic metres.

Causes of water quality deterioration

Groundwater is the major source of drinking water in rural India. However, uncontrolled extraction without commensurate recharge and leaching of pollutants from pesticides and fertilizers into the aquifers has resulted in pollution of groundwater supplies. In addition to leachates from agriculture, over the last decade industrial waste and the municipal solid waste have emerged as the leading causes of the pollution of surface and groundwater. Rapid industrialization and economic growth have led to the intensification of consumerism, which in turn has added to the problem of disposing of colossal amounts of garbage generated each day. Unfortunately, few reliable statistics on solid waste generation are available at the national level. In the year 1984, the national per capita generation of waste was estimated to be 250 grams/day (Holmes, 1984).

In Indian cities, MSW generally remains poorly managed due to various factors – inadequate finances, low political priority, inadequately trained personnel, and lack of proper disposal sites. As a result, residents are prone to diseases like hepatitis, malaria, dengue fever, elephantiasis, cholera, etc.

For the waste that is managed, land filling is the most commonly utilized method of disposal. However, since this primarily translates to open piles of decaying trash, rather than controlled below-ground burial, such unscientific dumping of wastes often poses a great danger to water resources in neighbouring areas. The problem is further complicated by the frequent presence of other kinds of waste, specifically, infectious hospital waste, slaughterhouse refuse, and various toxic organics and inorganics. All of these contaminants can find their way into local water bodies, and subsequently lead to the water quality problems outlined above.

Status of water quality

A 1994 survey of the groundwater quality at 138 sampling locations in 22 industrialized zones of India revealed that water in all 22 zones was not fit for drinking, due to high bacteriological and heavy metal contamination (CPCB, various years). It is estimated that 1.5 million pre-school children in India die every year from diarrhoea, and that cholera, dysentery and gastroenteritis are responsible for 60% of the total urban deaths (Sivaramakrishnan, 1993). In 1990, there were almost ten million cases of acute diarrhoeal diseases, 1.8 million of malaria, and 3700 of cholera (MHFW, 1992). The city of Surat in Gujarat, previously world-renowned for its diamond cutting and art silk, now holds the dubious distinction of being the "plague city" of India. Pneumonic plague claimed hundreds of lives in this city in September 1994, owing to abysmal civic conditions.

All these diseases are water-borne and claim a large number of lives every year in spite of better health facilities and increased expenditure on health. In urban regions, river water is, to a large extent, treated before it is supplied by the municipal authorities to the people for drinking and other domestic purposes. However, most Indian rivers today fall short of Central Pollution Control Board's standards, due to excessive pollution by untreated sewage, and domestic and industrial waste. Biological oxygen demand (BOD) and most probable number (MPN) coliform are direct measures of the extent of organic pollution of any water body. As per the data generated by CPCB from its 270 monitoring stations across all 28 major Indian rivers under its MINARS programme, mean BOD values have shown a marginal increase over 1979-1991, remaining in excess of the standard value of 3 mg/L.

However, the minimum and maximum coliform values have demonstrated 30-fold and 100,000-fold increases over the same time period, indicating severe pollution. Of all the 28 Indian rivers studied, only two have coliform levels below the acceptable standard of 5000 MPN/100 ml. According to the BOD and MPN values, Sabarmati and Ganga are the dirtiest rivers of India.

Responses

India has had environmental legislation dealing with water pollution since the Indian Penal Code of 1860. However, this law and similar laws over the next 100 years deal with only public springs and reservoirs used for the purpose of drinking. It was not until the 1974 Water (Prevention and Control of Pollution) Act, that water quality was considered legally as an environmental issue. This act, and the Environment Protection Act which followed in 1986, empowered the Central Pollution Control Board to lay down and maintain ambient water standards, to demand information regarding effluent emissions, to shut down polluting activities, and to prevent new discharges of effluent and sewage. Although these regulations give the national bodies and their state-level counterparts broad powers to control the problem of water pollution, until recently, enforcement has been rather weak, and there is still ample room for improvement. In 1987, the first year after the passage of the EPA, there were less than 1700 cases nationwide launched regarding water quality. This figure increased to 4400 in 1992 (Mehta, *et al.*, 1993). The success rate of prosecution in these court cases has, however, showed a gradual decline over this time, from 81 percent in 1988, to only 62 percent in 1992.

Air quality

India's urban areas represent complex environmental problems. In particular, the quality of the ambient air in these areas has been deteriorating rapidly over the past few decades, due to vehicular, thermal power, and industrial emissions.

Causes of air pollution

Between 1950 and 1990, the number of vehicles has grown 70 times, from about 0.3 million to more than 21 million (MST, 1993). At the same time, the figure per 1000 population has increased from 0.85 to 25.31, and is expected to exceed 40 by the year 2000. The bulk of this vehicular population is found in urban centres, with about one-third concentrated in the 23 metropolitan cities of the country. Furthermore, of the total 25 million vehicles registered in 1993, 82 percent are personal modes of transport, with the share of two-wheelers and cars at 70 percent and 12 percent respectively. During the period 1951-1991, the share of 2-wheelers has grown from 9 percent to 66 percent, while that of automobiles has fallen from 52 percent to 14 percent. Although 2-wheelers are generally more fuel efficient than passenger cars, they often exercise little pollution control, thereby contributing greatly to carbon monoxide, sulfur dioxide and nitrogen oxide emissions.

The total length of Indian roads has increased five-fold from 400,000 kilometres in 1950/51 to 2,103,000 km in 1990/91. However, this increase in road capacity is inadequate in comparison to the number of vehicles just mentioned. The marked increase in vehicles per person has been evident in the growing problem of road congestion in Indian cities. While 'traffic jams' are a problem typically associated with developed country cities, India is now beginning to experience similar gridlocks.

A study of 12 Indian cities by the Central Institute of Road Transport found Delhi to clearly be the most congested city, followed by Calcutta (TERI, 1996b). However, several cities, most notably Madras and Coimbatore, have relatively little congestion. In addition to the great inconvenience caused by this, over-congestion tends to degrade the roads and causes decreases in vehicle fuel efficiency. Furthermore, such road congestion exacerbates the problem of certain types of air pollution, e.g. ozone pollution, which tend to be localized in nature.

Data on industrial pollution in India are relatively scarce. Estimates of the magnitude of toxic emissions, however, suggest that the problem is serious and growing. In the industrial sector, fossil fuels, particularly coal, are one of the major sources of energy input contributing in turn to air pollution in the form of suspended particulates.

Trend analysis and projections show that there will be a considerable rise in pollutant emissions from thermal power as well as industrial sources over the next two decades (TERI, 1992). This signifies that more comprehensive measures to tackle air pollution must be adopted in the immediate future and implemented stringently to protect the environment.

Status of air quality

The air quality data for India's four urban conglomerates indicates that ambient levels of suspended particulate matter (SPM) considerably exceed the World Health Organization standards as well as National Ambient Air Quality Standards set by the Central Pollution Control Board (CPCB). Of the 26 Indian cities for which data are available, 23 exceed the prescribed guidelines. By far, the city with the worst particulate problem is Dehradun, which exceeds the SPM standard almost by a factor of six. Sulfur dioxide and nitrogen oxide levels in these cities still fall within the prescribed standards, but are rapidly rising due to the rapid rise in the number of motor vehicles.

An estimated 2000 metric tonnes of air pollutants are emitted into the atmosphere every day in Delhi. Vehicular sources contribute about 64 percent of total pollutants emitted, followed by thermal power plants, 16 percent, industries, 12 percent, and 7 percent from the domestic sector (TERI, 1996a).

The toxic nature of the air pollutants and their high concentrations in many industrialized regions of the country are posing serious concerns, both in terms of human health and damage to man-made structures and to India's ecology in general. In Bombay, where there are higher levels of sulfur dioxide, there has been an increased prevalence of breathing difficulties, coughs, and colds. Mortality data between 1971 and 1979 establish a link between dense air pollution in Bombay and a higher rate of death from respiratory and cardiac conditions, as well as cancer (World Resources Institute, 1995).

An additional point that is the object of growing concern is that of indoor air pollution. In both rural areas and in urban slum neighbourhoods, individuals perform their daily cooking in small, enclosed areas, and often use some form of biomass. These fuels do not burn cleanly, and emit many types of toxic gases like carbon monoxide, which when inhaled in these close quarters, can have deleterious health effects. Although the overall consumption of biomass is increasing more slowly than overall fuel consumption, indoor air pollution presents a growing concern because of the very large number of population inhabiting rural areas and urban slums. It is estimated that 40% of India's population (comprising of women and young children) are exposed to such pollution.

Responses to air quality deterioration

As with water quality standards, measures for ensuring the maintenance of air quality are entrusted with the CPCB and SPCBs under the Ministry of Environment and Forests. The present air quality regulation was created under the Air (Prevention and Control of Pollution) Act of 1981 as well as the Environmental Protection Act of 1986. These acts empower the agencies to set and uphold Minimal National Standards (MINARS) for effluents from industries and National Ambient Air Quality Standards (NAAQS), as described above. The CPCB is also responsible for the National Ambient Air Quality Monitoring (NAAQM) network, which presently includes 290 monitoring stations in 92 cities across India.

Statistics regarding the number of violators and the enforcement of these regulations have been collected only recently. A nationwide study of medium to large industrial undertakings in 1994 found that of the 1551 existing units, 1125 had adequate facilities to meet the ambient quality and emission standards (CPCB, 1995). Of the balance, 107 shut down, 258 of those in violation were constructed before the advent of the 1981 law, and 61 were constructed after. Furthermore, urban areas have taken action to improve their ambient quality by relocating some of the more polluting industries from high density, highly polluted areas, to lower density areas that can accommodate emissions with less damage to inhabitants. For example, Delhi, which has experienced a massive growth in small-scale industries in the last 15 years, has been directed by the Supreme Court to relocate its 114 highly-polluting stone crushers to outside the city boundaries. Consequently, many of these offenders have moved into the neighbouring state of Haryana, where the environment is better able to assimilate particulate matter released from crushed rocks (WWF, 1995).

Soil Degradation

India has, at least to some degree, been able to keep pace with its growth in numbers, and has even been able to achieve increases in per capita agricultural output for its average citizen. These aforementioned gains have been accomplished through the extensification of land under agriculture, as well as the intensification of agricultural inputs, i.e. fertilizers, pesticides, and irrigation. Unfortunately, the gains resulting from these practices have not been without their consequent environmental costs. What follows is a brief outline of India's use of agricultural inputs, followed by a description of the soil degradation that has resulted.

Pressures on soil resources

Land use

Beginning with agricultural extensification, the amount of India's land area dedicated to foodgrain cropping has grown steadily, from 99.3 million hectares in 1950, to 127.5 million hectares in 1991 (Ministry of Agriculture, 1995), and the total land used for agriculture is currently almost 170 million hectares. An additional 12 million hectares fall under the classification of 'meadows and pasture,' and are utilized for animal husbandry. Much of this increment of land over the last four decades has come from previously forested areas, as well as marginal and hill areas.

Fertilizer consumption

In India, total nitrogen, phosphorus, and potassium fertilizer consumption grew from 0.06 million metric tonnes in 1952 to 1.1 mmt in 1966/67 – an annual growth rate of 21 percent (CMIE, 1995). The subsequent three decades have shown continued growth at 9.5 percent annually, making India the fourth largest consumer in the world. The most recent data places India's fertilizer consumption at 69.66 kg/ha. However, in the face of limited land availability and growing land degradation problems, meeting the food requirements of an ever-increasing population will necessitate the consumption of fertilizer for crop production to increase to 22 mmt in 2000.

Pesticide consumption

India has increased its consumption of insecticides, herbicides, fungicides, bactericides, and rodenticides from only a little over two thousand tonnes in 1951 to 82 thousand tonnes in 1991 . The largest percentage of this figure is made up by insecticides, which comprise about two thirds of the total. It is believed that there is some potential for future gains in pesticide efficacy, as a portion of rural farmers are suspected to practice inappropriate application of the chemicals due to improper information, etc.

Irrigation

While all crops have experienced extensification of irrigation, the case of wheat has been the most remarkable – more than doubling over the four decades, from 31.5 percent under irrigation, to over 78 percent. The majority of this increase has come from increases in water extracted from groundwater supplies. This is significant because in many ways, groundwater supplies should be considered a non-renewable resource. Finally, the demand for water for irrigation is expected to increase markedly over the next few decades, in line with population growth. Estimates for 1990 place the demand for irrigation water at 46 million hectare metres, and project a growth to over 85 million Mham by 2025 (CWC, 1993 and Shah, 1987).

Status of soil quality

The results of this substantial increase in use of agricultural inputs are noticeable, e.g., rice paddy production more than tripled over the same period. Although these advances in productivity have been encouraging, it must be pointed out that while total grain production has almost doubled since 1960, fertilizer and pesticide use have grown by over an order of magnitude during the same period. This chemical intensity has become a source of concern since a significant portion of fertilizer and pesticide applied to the soil runs off into surface water or leaches into groundwater. These present grave potential of ecological damage, like eutrophication of surface water due to nitrogen and phosphorous runoff, or human toxic effects, like 'Blue Baby Syndrome' due to nitrates in groundwater, or cancer and organ damage from breathing and ingesting pesticides. Increases in cropped area and irrigation have their own associated impacts, like soil erosion, waterlogging, and the steady buildup of salts.

In general, India has experienced an expansion of degraded land area from 130 million hectares in 1987 to 188 million in 1993. Unfortunately, reliable time series data area not available for other degradation categories.

The largest category by far is that of land affected by water erosion, which represents almost half of total Indian land area, and 80 percent of degraded land. Most of this damage is in the form of loss of topsoil. Among the remaining categories, salinization, waterlogging, and loss of top soil from wind erosion, (the former two resulting from over-irrigation) are the most pervasive problems. Of these, reliable time series data are available only for salt affected land, which has grown from 7.18 million hectares in 1987 to over 10 million in 1993. Both water erosion and wind erosion damage can be attributed to inadequate land cover, whether it be from deforestation, monocropping, overgrazing, or from farming on marginal and hill areas. An additional problem, chemical deterioration in the form of nutrient loss and leaching, is the result of shortened fallow periods, which have decreased from 20 years to only a few years over a short five decades. Only 37 percent of Indian land area can be said to be largely free from degradation of any kind, and degraded land will continue its growth in years to come.

Responses to soil quality degradation

The issue of soil degradation in India must be taken very seriously by policy makers, as it presents the very real threat of limiting future gains in agricultural output and forest production, as well as risks to human health. However, the nature of soil degradation, i.e. the diverse factors that contribute to the problem, makes it difficult to create a single policy that addresses the situation. Certain areas, for example the control of deforestation which leads to erosion, fall under Central Government bodies like the Ministry of Environment and Forests. However, the benefits to soil resources which result from such policies are secondary to the main objectives, like preserving Indian forests.

Soil-related policy research at the central level is conducted by the Indian Council for Agricultural Research (ICAR). Much of the research carried out by ICAR is largely dedicated to the Green Revolution, which involves developing new agricultural technologies. However, one of the programs, namely, the 'lab to land' extension program, has also had the potential to improve soil conservation practices. Its objective was to use extension agents for educating rural farmers in the conservation of soil and water and in sustainable cropping practices. Unfortunately, the program was poorly administered, and has since become dysfunctional. There have also been many such efforts at the state level, but they have met with similar fates. Exacerbating the matter are government policies which encourage the degradation of resources, rather than their conservation, e.g. the nationalization of village water resources and subsidies on irrigation power and pesticides. Perhaps the hope for the future of soil resources lies in the actions of grassroot-level NGOs, which are becoming increasingly active in developmental activities as well as disseminating environment-friendly technologies. Further emphasis may also be placed on resource management strategies based on the agro-ecosystems approach and on the development of integrated land use policies.

Solid wastes

Municipal solid wastes

Presently, India generates 25 million tonnes of solid waste per annum, 25% of which is being generated by the four mega-cities. In the year 1984, the national per capita generation of waste was estimated to be 250 g (1 litre) per day. On an average solid wastes have the potential to fill up one football ground per day for a height of one metre.

With the paucity of data on quantity of MSW and its characteristics, the management of the MSW is very poor. Unsafe land dumping is the most common practice in the country.

Industrial solid wastes

The major generators of industrial solid waste are the thermal power plants producing coal ash; the integrated iron and steel mills producing blast furnace slag and steel melting slag; non-ferrous industries like aluminum, zinc and copper producing red mud and tailings, sugar industries generating press mud, pulp and paper industries producing gypsum. The environmental impacts of such wastes include

- Soil degradation
- Surface water/ ground water contamination

There is paucity of classified data on the quantum of these wastes generated except for slag in integrated iron and steel industry. It is estimated that the amount of blast furnace (BF) slag produced in India is on average 300-500 kg per ton of hot metal depending on the quality of ore and other materials used. The generation of total BF slag for SAIL plants is estimated to go upto 5.13 and 6.06 million ton by 1995 and 2000 respectively.

30-60% of blast furnace slag is presently being granulated depending upon market requirements (mostly by cement industry). Hence, slag has seen a prospect of utilization but fly ash which can also be used, is in utter disregard.

Hazardous wastes

Indian industries also produce large quantity of hazardous wastes. The major generators of the waste are petrochemical, pesticide, petroleum, fertilizer, paint and dye, asbestos, caustic soda, pharmaceutical, inorganic chemicals and general engineering industries. A conservative estimate of hazardous waste generated in India ranges from 400 to thousand to 600 thousand tones per annum.

Mining wastes

Coal production rose from about 78 million tones in 1973 when the coal industry was nationalized to 254 million tones in 1995. On an average, at present, 700 to 800 million cubic metre of the waste is being generated. Though the waste is to be used for back-refilling but at present not more than 30% of the waste is being utilized for this purpose.

In western countries coal mines are in fact earning from the real estates derived from the back filling.

Costs of environmental degradation

Water and air pollution have great economic and health costs (about Rs 25,000 crores per year). Land degradation and deforestation have great financial and productivity costs (about Rs 9,500 crores) in terms of foregone agricultural, livestock, forestry, and tourism income. These costs will only increase if current environmental degradation trends are not reversed.

- Water degradation has the highest health toll across the country, and therefore demands attention. The problem is more pervasive than the more localized, albeit serious and worsening situation concerning urban air pollution. Of course, both issues deserve attention, and the point of priority-setting is to not propose an all-or-nothing approach to one problem or another, but to balance the cost-effectiveness of interventions. *Since budgets are limited, "environmental investments," like any investment, should be approached with achieving the highest rate of return possible.*
- Improved economic and social savings gained through improved environmental management are highly progressive, in that the beneficiaries are overwhelmingly the poor -- in both urban and rural areas -- who are less buffered from the health and income impacts of water pollution, air pollution, and soil degradation than the rich (Brandon and Homman, 1995).

Environmental management and constraints

Organization of the sector

The Ministry of Environment and Forests, Government of India, is the central agency for planning, promoting and coordinating environmental programmes, apart from policy formulation. Similarly, the executive responsibilities for controlling industrial pollution rests with the Central Pollution Control Board (CPCB). This is a statutory authority, attached to the Ministry of Environment and Forests, and was constituted in 1974 for implementing the provisions of the Water (Prevention and Control of Pollution) Act, 1974. The state departments of environment and the state pollution control boards are the designated agencies that perform these functions at the state level. The central/state pollution control boards were, subsequently, also given the responsibility of implementing other specific environmental enactments.

Environmental legislation

India was the first country to provide for the protection and improvement of the environment in its Constitution. Clause (g) of Article 51(a) of the Constitution states: *It should be the duty of every citizen of India to protect and improve the natural environment including the forests, lakes, rivers and wildlife and to have compassion for living creatures.* The directive principles of state policy, an integral and significant element of India's democratic set-up, also contain a specific provision enunciating the State's commitment for protecting the environment. These constitutional provisions are implemented through environmental protection laws of the country. The major enactments are listed in **Table 1.**

Table 1 Environmental Legislation in India

Particulars	*Environmental Legislation*
General	The Environment (Protection) Act, 1986 The Public Liability Insurance Act, 1991 The Environment Audit notification, 1992 The Public Liability Insurance Act, Amendments, 1992 The National Environment Tribunal Bill, 1992 The Environmental Standards Notification, 1993 The EIA Notification, 1994 The Ancient Monuments and Archeological Sites and Remains Act, 1958
Air	The Air (Prevention and Control of Pollution) Act, 1981 The Air (Prevention and Control of Pollution) Act, Amendments, 1982, 1983, 1987 The Motor Vehicles (Amendment) Act, 1988
Water	The Water (Prevention and Control of pollution) Act, 1974 The Water (Prevention and Control of Pollution) Act, Rules and Amendments, 1977, 1978, 1992 The Water Cess Act, 1977 The Oil fields (regulation and development) Act, 1984 The Coastal Regulation Zone Notification, 1991
Hazardous Chemicals/ Wastes	The Hazardous Wastes (Management and Handling) Rules, 1989 Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989
Forests & Wildlife	Wildlife (Protection) Act, 1972 Wild Life Protection Act, Amendments, 1973, 1991 The Forest (Conservation) Act, 1980 The Forest (Conservation) Act, Rules, 1981

Environmental programmes

The main programmes being undertaken by the Ministry of Environment include (a) survey of India's natural resources, (b) conservation of its natural resources, (c) environmental impact assessment: assessment and regulation for management, (d) monitoring, control and prevention of pollution, (e) management of hazardous substances, (f) regeneration and development including the Ganga Action Plan, afforestation and eco-development, (g) education and information dissemination in forestry and wildlife and promoting environmental awareness, (h) research on natural resources and ecosystems and (i) legislation and organizational support for environmental management.

National priorities

The priority areas mentioned in the National Environment Action Programme are:

- Conservation and sustainable utilization of biodiversity in selected ecosystems.
- Afforestation, wasteland development, conservation of soil and moisture, and prevention of ground and surface water pollution.
- Control of industrial pollution, with emphasis on the reduction and management of wastes, particularly hazardous wastes.
- Access to clean technologies.
- Urban environmental issues.
- Development of an alternative energy plan.

Scientific understanding of environment issues, training, creation of environmental awareness, resource assessment, and water management problems.

External aid in the environment sector

External aid has mainly focused on strengthening PCBs, industrial pollution control, and urban strategies. A state-wise analysis (**Table 2**) indicates that Punjab, Kerala, West Bengal, Maharashtra, Himachal Pradesh, and Delhi have not benefitted much in comparison with other states, given their environmental status.

Table 2 State-wise distribution of external aid in the environment sector

State	Externally funded programmes	Environmental profile		
		Highly polluting industries (nos.)	Critically polluted areas	Million-plus cities (nos.)
Andhra Pradesh	• Training and research institute, SIDA • Netherlands government priority state • Support to PCB, World Bank	173	• Visakhapatnam • Pattancheru	2
Arunachal Pradesh		0		
Assam		15	• Digboi	
Bihar	• Master plan for environmental quality management, UNIDO	62	• Dhanbad	1
Delhi	• Urban environment programme, World Bank	5	• Najafgarh	1
Goa		6		
Gujarat	• Strengthening PCB, ADB • Netherlands government priority state • Capacity building, World Bank • Surat urban management programme, World Bank	177	• Vapi	3
Haryana		43		
Himachal Pradesh		9	• Parwanoo • Kala Amb	
Jammu & Kashmir		8		
Karnataka	• DANIDA priority state • Netherlands government priority state • Support to PCB, World Bank • Urban infrastructure development, ADB	85	• Bhadravati	1
Kerala	• Netherlands government priority state	28	• Cochin	1
Madhya Pradesh	• DANIDA priority state • Support to PCB, World Bank	78	• Korba • Nagda	2
Maharashtra	• Strengthening PCB, ADB • Support to PCB, World Bank • Bombay URBAIR project, World Bank	335	• Chembur	3

Manipur		0		
Meghalaya		1		
Mizoram		0		
Nagaland		0		
Orissa	• DANIDA priority state • Aluminium sector, NORAD • Institutional cooperation, NORAD	23	• Talcher	
Punjab		45	• Gobind-garh	1
Rajasthan	• Institutional cooperation, NORAD • Support to PCB, World Bank	49	• Pali • Jodhpur	1
Sikkim		1		
Tamil Nadu	• Strengthening PCB, ADB • DANIDA priority state • Support to PCB, World Bank • Urban Development, World Bank • University research facilities, Germany	119	• Manali • North Arcot	3
Tripura		0		
Uttar Pradesh	• Agra trapezium project, ADB • Strengthening PCB, ADB • Aluminium sector, NORAD • Institutional cooperation, NORAD • Netherlands government priority state • Support to PCB, World Bank • Urban Development, World Bank	224	• Kanpur • Doon Valley • Singrauli	3
West Bengal	• Action research in foundries, SDC • Industrial pollution control, World Bank • Industrial pollution control, Japan, OECF • Calcutta Environmental Strategy, ODA	58	• Durgapur • Howrah	1

Constraints

The main constraints that come in the way of effective management of the sector are (World Bank, 1996):

Financial

- Incorporating environmental consideration into development projects requires more resources, which puts more pressure on the already meager amounts of public investment.

Legal

- There is no separate legislation for conservation and protection of lands and the environmentally critical ecosystems of wetlands, mangroves, coral reefs, range lands, watersheds, and irrigation command areas.
- Although there is a national water policy, legislation for regulating exploitation of surface and groundwater resources has not yet been formulated.

- The number and variety of fiscal instruments to tackle environmental problems are limited.

Institutional

- The research and development infrastructure is inadequate.
- Panchayats and urban local bodies that are to implement the program have not yet been assigned the crucial tasks of conservation and environmental protection.
- The constitutional status accorded to local governments has underscored the urgency of evolving a participatory management system.

Organizational

- There are no organizations capable of imparting technical skills for environmental management, such as environmental impact assessment at the local and regional levels.
- Policymakers, administrators, trainers, educators, students, local government authorities, and grassroots individuals and organizations are not adequately trained in environmental sciences and management.

Technical

- Accounting for the intrinsic value of natural resources is still a process in its infancy.
- Environmental impact assessments for various categories of natural resources and development projects are constrained by a lack of data on resource availability as well as by the pressure to ensure quick development.
- The need to define environmental parameters at local levels is constrained by a lack of data.

Human resources

- There is a lack of high-quality human resources and organizations at the local and regional levels.
- There is only limited public awareness of environmental issues at the school, university, and nonformal levels.

Gender issues

Gender specificity of environmental effects mainly arises from pre-existing gender inequalities in division of labour; the intra-household distribution of subsistence resources; access to productive resources, other assets, income earning opportunities, and participation in decision making. Gender issues are discussed here in the narrow context of pollution problems (Brown Agenda). The gender analysis of any pollution problems indicates three types of situations:

a) Situations where only women and children are exposed to certain pollutants.

Examples are: occupational exposure in industries (organized or unorganized) where only women are employed, such as electronics, matchbox and fireworks, agate, slate, brick, rag-picking etc. Clearly, in such situations women are the sole victims of pollution, and therefore their participation in decision making is more than justified. According to the Ministry of Labour, in 1994 about 497,000 women worked in factories, 56,000 in mines, and 558,000 in plantation industries. Since women have a disadvantaged position in the labour market and because of their lower occupational mobility, they are unable to move away from hazardous environments. The health effects of air pollution due to cooking with low grade fuels is another example. The fetching of polluted water; bathing or washing clothes in polluted waters is yet another example.

b) Situations where men and women are equally exposed to similar levels of pollution, but the weaker physiological status and other factors make women more vulnerable to the affects of pollution. Such a situation is more common in rural areas and slums. For example, all people living on the roads are exposed to similar levels of pollutants generated from vehicles. But the weaker physiological status of urban poor women makes them succumb to pollution related illness more easily than their male family members. Here the participation of women is justified on the basis of the fact that they form the bulk of the affected population.

c) Situations where men and women are exposed to similar levels of pollution and the health outcomes are also similar. This is more common in comparatively affluent classes of the population. In such situations the participation of women is justified because they form approximately half the affected population.

The Government of India has begun to formulate policies and laws to address the problems of women and children in the work environment. A special cell within the Ministry of Labour seeks to improve working conditions, wages, and skills of women. Under the Equal Remuneration Act, state committees advise the central government on women's employment. In addition, the Department of Women and Child Development has issued a national perspective plan to address issues through the year 2000, and the Department of Science and Technology is supporting research to improve protective measures against occupational hazards.

Key strategies for the future

Legal and judicial strengthening

- Review of the legal framework that focuses on the role of government policy and institutions, scientific evidence, and appropriate types of penalties.
- Court decisions should be reviewed to propose environmental definitions, legal rules and guidelines.

- Reducing the multiplicity of laws, which otherwise serve to a) confuse the public, b) provide loop-holes for softer penalties, and c) slow down the legal process.

Organizational

- The centre must initiate a decentralization process, wherein the states play a nodal role in planning, clearance, and monitoring of projects. The centre's role in such a situation would be:
  - strategic planning
  - capacity building (of government and non-governmental agencies)
  - promoting a scientific understanding of issues (for informed public policy and decision making)
  - creating awareness.
- The public sector undertakings must play the role model in environmental planning and operations, so that private entrepreneurs (big and small) are inspired to follow their example of environmentally responsible corporate behavior.
- The central government must build the capacity of state agencies (pollution control boards, electricity boards, industrial development corporations, mining agencies, public works, etc.) and empower them. The aim of capacity building would be to help these agencies in incorporating environmental concerns right from the stage of project designing and planning.
- The process of environmental clearance must be rationalized, post-clearance monitoring must be strengthened, and the professionalism and integrity of clearance committees must be ensured.

Role of industry

- To elicit the cooperation of industry it is necessary for the government to equip industry with tools and incentives that lead to environmental goals.
- Training the industry for environmental audits as well as enabling it to meet international standards.

Regional planning

- To ensure sustainable development of industrial complexes and urban areas the government should institutionalize regional Environmental Impact Assessments and Carrying Capacity estimations.

- To cut down the time taken to conduct EIAs and regional assessments one very cost-effective programme would be the creation of regional repositories of information and data.

Environmental health

Often it is forgotten that the ultimate objectives of environmental programmes are basically two fold: protection of human health and maintenance of the integrity of ecosystems. Given the scarce financial resources it does not make sense to control pollution just for the sake of controlling pollution. Logically, at this stage of India's development, the success of environmental programmes ought to be measured in terms of health benefits. The purpose of environmental programmes is defeated if their success is measured just in terms of improvement in ambient quality, or worse, just in terms of number of control devices installed or number of legislations enacted. **Human health is therefore not just a social goal but an environmental one as well.**

Programmes in this area should aid planners and decision makers to:

- set precisely defined goals and targets in terms of expected health benefits
- incorporate health risk assessments in all decision making processes

Public involvement

- Public participation in decision making has to be given a greater thrust than ever before.
- The output of information networks, such as ENVIS, should also have a component that provides scientific, objective information in a form that is readily comprehended by laypersons.
- The government should also undertake initiatives that seek to consolidate information that is gathered by reliable NGOs (research and non-research) at the grass-roots levels. The information thus gathered should include not just data, but public perceptions and concerns as well.

Financing the programmes

The NEAP states that:

> *"The scope of public investment being rather limited, there is a need to attract private and external sources of financing for carrying out the crucial tasks of ensuring conservation and sustainable development."*

It needs to be clearly recognized that the solution to the problem of financial un-sustainability of the current programmes does not lie in finding or expecting additional finances through the public sector budgets or through external agencies. The solution would lie in:

- redefining the role of the state and shifting the focus from command and control approach to the use of economic instruments with enhanced role and responsibility of private sector and public participation, and
- re-orienting and enhancing the role of external assistance in financing the various programmes (Mathur, 1996).

Programme selection, design criteria, and approach

UNDP's thrust

The programme and the projects under the programme should reflect to a large measure the central thrust of UNDP:

- poverty eradication
- advancement of women and children
- productive employment
- protection and regeneration of the environment.

The process of Sustainable Human Development

The programme would adopt an approach that includes:

- people centred approach
- sustainable economic growth
- transfer of environmentally sound technologies
- involvement of multiple stakeholders.

India's key concerns and priorities

UNDP supported GOI's efforts to prepare the National Environment Action Programme (NEAP). The concerns and priorities mentioned in the NEAP need to be adequately addressed in the new programme.

Ability to leverage non-UNDP resources

The programme must prepare the ground for future lending programmes that are viewed as being viable by lending/donor agencies. This will be one of the factors that ensures that the programme sustains beyond UNDP's involvement (in time and in different parts of the country).

Cost-effectiveness

Since budgets are limited, "environmental investments", like any investment, should be approached with achieving the highest rate of return possible (Brandon and Hommann, 1995). The World Bank has estimated that in India the costs of water and soil pollution are 79% of the total environmental costs (water: 59%; soil: 20%). Air pollution costs 14% of the total costs. Though these estimates are only indicative, it is evident that projects that are to do with improving water quality have the highest environmental and economic returns.

Sustainability of the programme

Institutional capacity building is a condition for integrating development efforts and to leave lasting effects of interventions (Mikkelsen, 1995). This should be kept in mind while designing the programme. Experience suggests **that the organizational structure is less important than clarity of mandate, adequate resources and technical skills, authority to operate across disciplinary and jurisdictional lines, and accountability for results** (Serageldin, 1994).

In addition, the programme must be amenable to participatory monitoring and evaluation. Finally, the programmes should be such that their impact is realistically and meaningfully measurable in exact environmental terms. The World Bank has developed a set of indicators that measure project/programme impact. These may be used here ,too.

Sustainable development goes beyond traditional environmental management

It is now recognized that sustainable development is all about balancing the economic objectives, ecological objectives, and social objectives (see Figure 1). In addition, if we are to recall the stress on involvement of multiple stakeholders, then it is logical that UNDP's programme must:

- **strengthen the activities of those agencies that have a 'protective' role -**
  - Ministry of Environment and Forests
  - Ministry of Health and Family Welfare
  - Ministry of Urban Affairs and Employment
  - Ministry of Human Resource Development
  - Ministry of Non-Conventional Energy Sources
  - Ministry of Rural Areas and Employment
  - Ministry of Welfare

Even in the narrower sense of environmental protection UNDP's programme must aim at promoting cooperation among these ministries. Programmes could reflect **common national goals** set by these ministries.

- **enable those agencies whose primary objective is economic development to incorporate environmental parameters at the time of their programme inception and design -**
  - Ministry of Agriculture
  - Ministry of Chemicals and Fertilizers
  - Ministry of Tourism
  - Ministry of Coal
  - Ministry of Commerce
  - Ministry of Food Processing Industries
  - Ministry of Industry
  - Ministry of Mines
  - Ministry of Petroleum and Natural Gas
  - Ministry of Planning and Programme Implementation
  - Ministry of Power

  - Ministry of Steel
  - Ministry of Surface Transport
  - Ministry of Textiles
  - Ministry of Water Resources
  - Department of Atomic Energy
  - Department of Ocean Development

The programmes here would aim at a) fostering dialogues with agencies in the above category, b) sensitizing all levels of administrators to environmental concerns, and c) capacity building of environmental cells in these ministries.

- Ideally, all these ministries should be covered in an environment programme. However, since this is the first time that UNDP would be attempting this approach, it may be practical to select a few from both the categories.

Other stakeholders

Apart from central ministries the programme should involve other stakeholders:

- Agencies that are the state level counterparts of the ministries mentioned above. Specially:
  - State Departments of Environment
  - State Pollution Control Boards
  - State Industrial Development Corporations
  - State Electricity Boards
  - Municipal bodies
- Private sector
- NGOs and Community Based Organizations (CBOs)
- Providers of data, information and knowledge (academia, government and other research agencies, media)
- Multilateral and bilateral agencies

Existing internally and externally funded programmes

UNDP's programme must complement and at times supplement the programmes launched by others.

Key strategies for management of India's environment

UNDP's programme must support one or more of the following key strategies for environmental management relevant to India's situation as it is today and likely developments in the future:

- Promoting informed decision making at all levels (information, research, networking, valuation, and risk assessments, etc.)
- Formulating appropriate decentralized planning and management practices

- Environmental management of the public sector and other governmental projects
- Public participation in decision making
- Assessment of the environmental consequences of economic reforms and restructuring
- Unifying and rationalizing the legal framework; also, development of a national rehabilitation policy
- Facilitating a role for the government that is more proactive, cooperative and guiding as against the current regulatory role that it is associated with.

Conceptual and methodological questions of sustainable development

In an attempt to bring together experts from different disciplines (economics, ecology, and sociology) – as equal partners – a number of conceptual and methodological questions need to be addressed. The key unresolved questions fall into four broad categories: valuation, decision making in the presence of thresholds and uncertainty, policy and institutional design, and social sustainability (Serageldin 1994). Hence, UNDP's programme must be designed to tackle some, if not all, of these questions

Identification of programmes

Environmental management is a continuous process that consists of five interconnected steps shown in Figure 2. We have attempted to identify programmes that fit into each of these five steps of environmental management.

Good management practices begin with a clear definition of desired goals. In India all stakeholders have poorly articulated their goals, specially in quantitative terms. There is thus a need for programmes that build the capacity of stakeholders to formulate targets. This will involve identification of appropriate indicators at various levels.

Identification of programmes

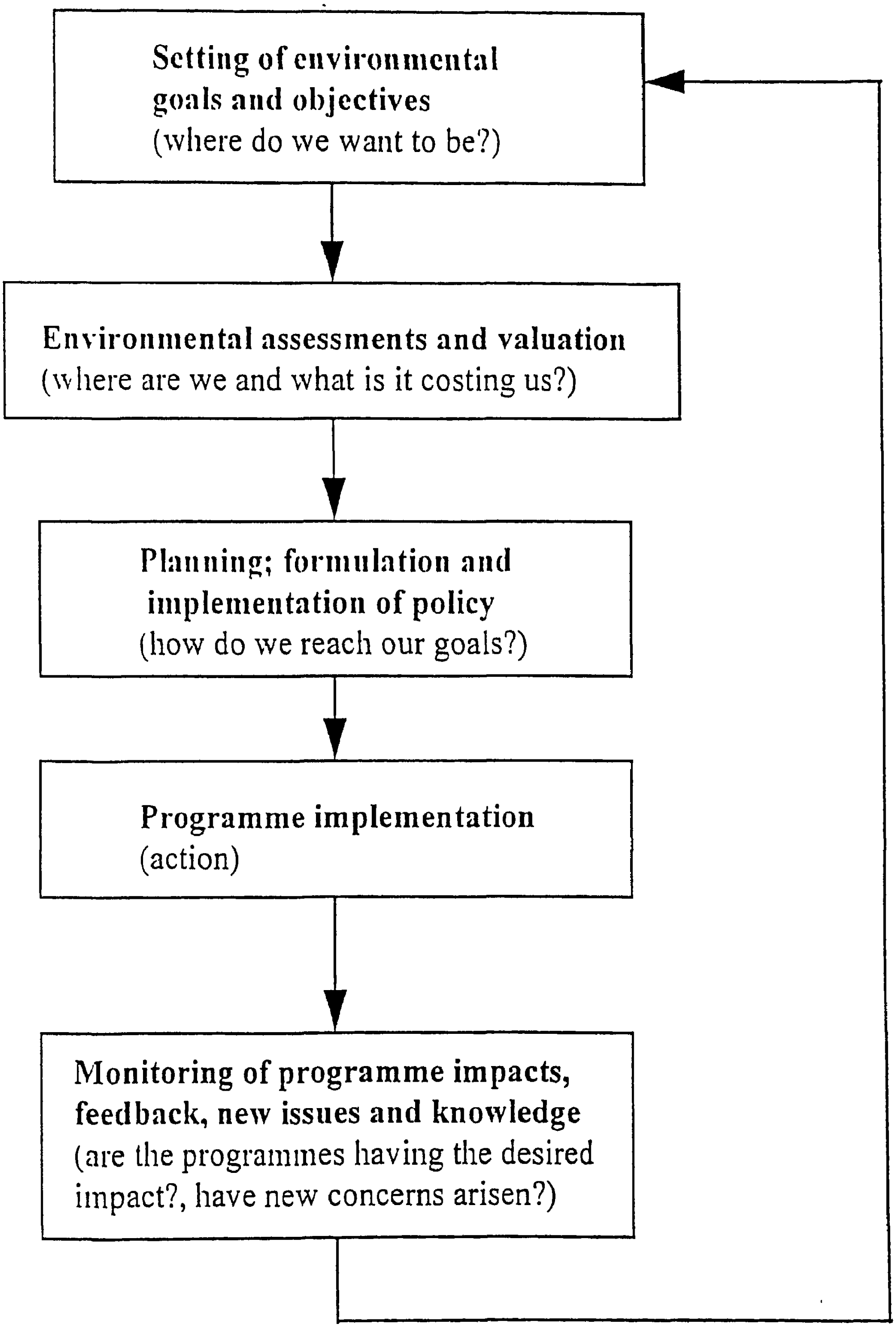
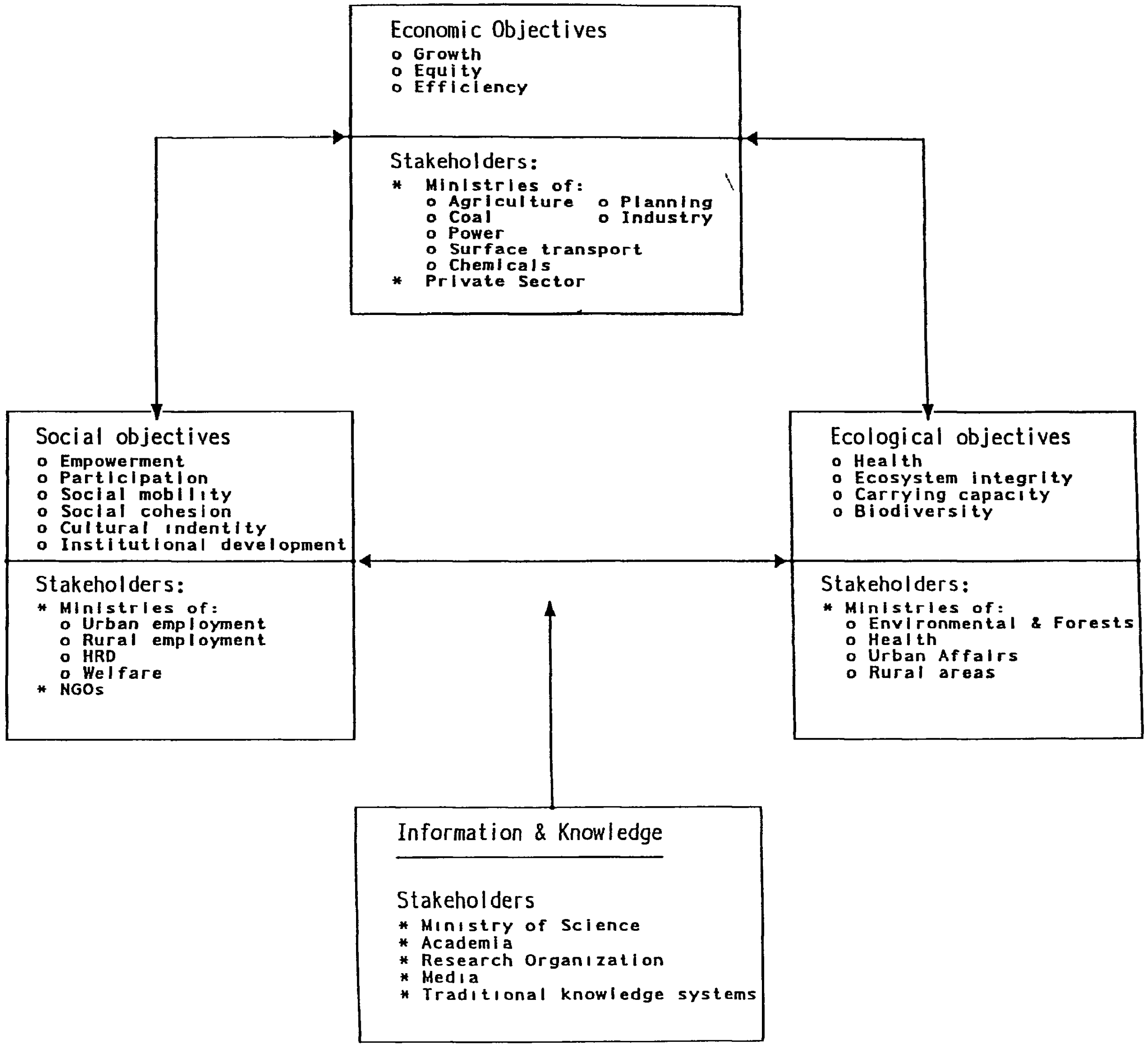

Setting of environmental goals and objectives
(where do we want to be?)
Environmental assessments and valuation
(where are we and what is it costing us?)
Planning; formulation and implementation of policy
(how do we reach our goals?)
Programme implementation
(action)
Monitoring of programme impacts, feedback, new issues and knowledge
(are the programmes having the desired impact?, have new concerns arisen?)

Figure 1. Objectives of environmentally sustainable development



Sub-programme 1
State-of-the environment reports at the state, district, and city level

Background and rationale

India has now an official report that describes the state of the environment (sponsored by UNEP/SACEP) as well as an NGO document (CSE). While there is some amount of disaggregation in these reports, in terms of identification of hot-spots, eco-fragile areas, case-studies, etc., these reports are largely national level exercises. In the spirit of decentralized management there is a need for state-of-the environment reports at the state level, district level, and city level. Some states, Madhya Pradesh (EPCO) and Delhi (CPCB), for example, have a report prepared by government agencies; others such as Orissa (funded by NORAD), Delhi, and Goa have reports prepared by NGOs. The basis of an ideal reporting process is a collective and cooperative assessment and reporting framework backed up by a comprehensive database consisting of precise data and information on a set of indicators which are to be regularly reviewed and reported. State-of-environment reporting also facilitates the measurement of progress towards sustainability.

Objectives

This component aims at improved availability of information on all aspects of environment and development for decision making towards sustainable development at local levels.

Specific activities

In sequence:

Capacity building

In this component state, district and city authorities, NGOs and researchers will be trained together on the preparation of state-of-environment reports and on their use. This component could involve representatives from all the states, about 25 districts and about 10 cities. **If multiple-stakeholders are trained together, then the success of actually preparing the reports jointly is ensured to a greater extent.** While a large number of areas will be covered in the training phase, the implementation will be only in a sub-set of this group.

Research

Through participatory research this component will aim to develop standardized environmental indicators. The development of indicators would reflect specific local priorities.

Implementation

It is recommended that the actual preparation of reports be done in the rapidly industrializing states such as Maharashtra, West Bengal, Kerala, Punjab, and UP. Given the large number of districts in the country, the programme could focus on 5 of those districts in which the designated critically polluted areas lie (24 in number). MoEF has already initiated programmes in these areas. As regards preparation of comprehensive and published reports, UNDP could discuss with GOI how the latter's efforts could be supplemented. Similar reports may be prepared for districts in which ecologically fragile areas lie. Lastly, it is recommended that reports be prepared for at least 10 cities with a population greater than one million. This exercise will also include development of specific urban environment indicators. Of the mega-cities, Mumbai and Chennai lack a comprehensive state-of-the environment report.

Rather than have separate reports prepared by official agencies and NGOs, these reports should arise out of collaborative efforts. The reports should include:

- Status of the bio-physical environment and socio-economic conditions
- Impacts on human health and ecosystem integrity, associated damage costs
- Pressure factors
- Existing management practices
- Institutions
- Cause-effect links
- Identification of problem areas, populations at risk, and priorities
- Gender-sensitive databases

The reports could be patterned along the lines of the Pressure-State-Response framework developed by OECD and in use in many countries.

In the first instance these reports could be based on secondary information. As a result of this effort data gaps would be identified. **Then, with UNDP's support, surveys could be initiated to collect missing information.** This would lead to an updated report at the end of five years. The aim should be that soon, at all levels, the outputs should be more in the nature of **State-of-Sustainable Development Reports**, and not just State-of-Environment Reports.

Coordinating agency

- Ministry of Environment and Forests, for state and district reports
- Ministry of Urban Affairs and Employment for city reports

Implementing institutes

- State departments of environment, district authorities, and municipalities
- Local NGOs

- **It would be desirable to make it mandatory that the report preparation team include at least one women's organization.**
- NGOs from states that have prepared similar reports may be involved in lending their experience. Thus, promoting experience sharing and networking among NGOs.

Which SHD processes does this support?

- Involvement of multiple stakeholders
- Advancement of women
- Protection of environment.

Which NEAP issue does this reflect?

- Strengthening scientific understanding of environmental issues
- Creating awareness

Which government programme/plan is this similar to?

- GOI has recently commissioned a national state-of environment report. The proposed programme is an effort to replicate this at lower levels of governance.

Which key management strategy does this address?

- Informed decision making
- Decentralized planning and management
- Incorporation of public perceptions and concerns
- Proactive role for government

Costs

- US$ 10 million

Links with other sub-programmes

- Environmental considerations in district and city planning
- Environmental valuation and accounting
- Bottom-to-top database and network

Sub-programme 2
Environmental considerations in district and city planning

Background and rationale

UNDP assisted GOI in preparing the National Environment Action Programme (here also many agencies outside the government contributed to the efforts). Similar reports need to be prepared at the state, district, city, and panchayat levels. This programme would be a logical extension of the one described in the previous chapter and could be implemented in the same states and districts.

Objectives

The objectives of the programme would be:

- review current policies, programmes, and constraints in management
- identify key concerns and priorities
- to identify projects and programmes for sustained flow of investments for providing better environmental services and for integrating environmental concerns into development projects
- to identify projects for institutional strengthening

Specific activities

- Pilot projects: Preparation of a District/City Land Use Plan based on environmental considerations. The plan will include urban and rural development, and planning for major infrastructure and would attempt to **integrate natural, human, and economic resources**. The possible areas for piloting are:
    - A coastal district of Kerala
    - Critical areas of Himachal Pradesh
    - Districts in Punjab that have clusters of agro-based industries
    - Foothills districts of UP
    - Burdwan district of West Bengal, which includes Durgapur (recall that a conventional role-model plan had been prepared under the guidance of the late Dr B C Roy).
    - Selected cities of different classes

- Capacity building: Training of officials in identifying financial needs for environmental protection, based on key concerns of the district, in consultation with the public. These financial implications may be incorporated in the annual district plan.
- Database networking: Many districts have implemented the Natural Resources Database Management System (NRDMS) scheme of the

Department of Science and Technology. The database mainly consists of information on socio-economic parameters and natural resources. There is little information in it that is of relevance to pollution problems. In the same districts, UNDP's programme could aim to incorporate 'Brown Agenda' issues in the database. This will entail surveys such as dry and wet inventories. For example, IIT Bombay, which is the technical support unit to the NRDMS scheme in Kheda district of Gujurat, could be involved in such efforts. An attempt could also be made to modify the database so that it becomes gender-sensitive.

- Participatory policy research: Studies in identifying efficient domains of local environmental governance. (The hypothesis here is that administrative units, even the smallest ones such as Panchayats or Wards, need not necessarily be the appropriate units for environmental management. The domains may be determined more by the physical nature of the problem, etc.). **The research teams should include women's organizations.**

Coordinating agency

- Planning Commission
- Ministry of Urban Affairs

Implementing institutes

- District planning authorities
- Town and Country Planning Departments
- State departments of environment
- NGOs and CBOs
- Project proponents

Which SHD processes does this support?

- People centred approach
- Sustainable economic growth
- Involvement of multiple stakeholders

Which NEAP issue does this reflect?

- Environmental training

Which government programme/plan is this similar to?

- This addresses the question of how to operationalize and give concrete form to the 73rd and 74th Constitutional Amendments.
- Zoning Atlas programme of CPCB.

Which key management strategy does this address?

- Formulating appropriate decentralized planning and management practices
- Proactive role of the government
- Public participation

Costs

- US$ 10 million

Links with other sub-programmes

- State, district, and city level status of the environment reports
- Regional master plans
- Planning of new industrial estates
- Coastal environment management

Sub-programme 3
Environmental valuation and accounting

Background and rationale

Environmental and natural resource accounting has emerged as a field of research in response to three criticisms which have been levelled against the traditional method of estimation of the level of, and growth in, economic activity. These three criticisms are:

- The common economic measures of economic performance, such as the GNP (gross national product), did not adequately reflect any degradation of the nation's environment.
- The conventional accounts treat reproducible wealth and natural wealth inconsistently. While an allowance for wear and tear of man-made capital such as machinery is made (depreciation), natural capital is not similarly depreciated.
- The conventional national accounts are incomplete in that the neglect important inputs and outputs in the nation's "production function" - inputs and outputs that have economic significance but are neglected because they lack market-determined values and prices.

The purpose of environmental and natural resource accounting is two fold:

- Scorekeeping: How bad is the state of the environment? What are the economic consequences of depletion and degradation?

  Gross Domestic Product which is adjusted for environmental depletion and degradation can signal an "unsustainable" growth path to policy makers, though the analysis of such trends are fraught with problems.

- Management: What can we do about the situation? What is causing the problem?

  Environmental and natural resource accounting can help policy makers prioritize environmental and natural resource concerns, and in a broad manner, in some cases, help make explicit the sectoral contribution to environmental degradation and depletion.

Objectives

The challenge is not simply to facilitate exercises in environmental and natural resource accounting which develop the field in India, but to structure these exercises so that they are useful in policy making. For instance, they may help remove certain inconsistencies in policies between different government departments and ministries.

Some general comments:

- The *process* of accounting is more important than the accounts themselves. The extent to which environmental valuation and accounting will meet UNDP's or other goals, is not exogenous, but depends on how we go about doing environmental valuation and accounting. It may or may not be relevant to the advancement of women and children, and it may or may not be cost-effective.
- The reason to do valuation is to arrive at cross sectoral linkages, to achieve comparability between immensely different things so that painful choices can have some, although, rough and ready, basis, which is better than none.
- Valuation of environmental impacts is often one of the ingredients of environmental accounting; but it may also be used in project or sectoral cost-benefit analysis, or environmental impact assessments.

Recommendations for a better green accounting and valuation process:

- Identify important resource and environmental problems
  Which problems affect the poorest, or women and children?
  The lack of drinking water quality affects the poorest in India, while indoor air pollution due to the use of biomass fuels takes its toll on women and children.
- Identify, up front, the policy measures that could possibly be implemented to tackle these problems
  In the case of urban transport, the use of alternative fuels etc.
- Involve the stakeholders and political institutions as early and clearly as possible.
  Users: political institutions and ministries - Ministry of Finance, Ministry of Environment and Forests
  Valuers and accounters: Such research institutions and statistical agencies as the Institute of Economic Growth and Central Statistical Organisation
  Data suppliers: Such institutions as the National Bureau of Soil Science and Land Use Planning, Central Electricity Planning
- Improve the flow of data and understanding between the suppliers of data and the valuers and accounters. Exploit to the utmost existing data collection routines, management concepts and tools capable of being integrated with and used part of the accounting systems. For instance, statistics on petroleum products consumption at the state level is published. This can be invaluable in building an air pollutant emissions inventory.
- Avoid ambitious theoretical system building and resist the temptation to engage in large indiscriminate data collection that very easily may emerge as an end in itself.

Specific activities

Four options for demonstration/pilot projects, in which the first phase will be capacity building (of about six months duration) are suggested:

Option 1: National level demonstration project (on the lines of IGIDR action plan)

Option 2: State level environmental and natural resource accounting
This activity will try to develop environmental and natural resource accounts at the state level. Perhaps this can be done for a smaller state like Goa first.

Option 3: Bottom up representative surveys
Example: drinking water surveys in different urban and rural locales, to assess the physical and economic impacts of water quality on health.

Option 4: Hot spots studies
In certain states, certain resources may be particularly important

Resource	State
Soil	Madhya Pradesh
Air	Delhi
Water	Rajasthan, Gujarat, Tamil Nadu
Forests and Biodiversity	Himachal Pradesh, Kerala, Arunachal Pradesh

Coordinating agency

- Ministry of Environment and Forests

Implementing agencies

- Research agencies
- Central Statistical Organization
- State Planning Institutes

Which SHD process does this support?

- People centred approach: this makes the important connection between human activities and environmental consequences, and helps provide information for minimising impacts.

- Sustainable economic growth: this can help provide the information base for clarifying this notion, providing signals of sustainability, and showing the way for appropriate interventions.
- **Women: The contamination of drinking water supplies, and the inadequacy of drinking water arrangements, the use of fuelwood for cooking energy, all impact women the most.**

Which NEAP issue does this reflect?

- Environmental and natural resource accounting is an activity which is given a fair amount of prominence in the NEAP

Which government programme/plan is this similar to?

- Capacity building in environmental economics

Which key management strategy does this address?

- Promoting informed decision making at all levels
- Formulating appropriate decentralized planning and management practices

Costs

- US$ 7.5 million

Links with other suggested sub-programmes

Outputs will flow from this programme to:

- State level, district level, status of the environment reports
- Environmental considerations in district and city planning
- Regional master plans
- Environmental management plans

Inputs from the following programmes will flow into environmental and natural resource accounting:

- Social and health impact assessments
- Development of fiscal instruments

Sub-programme 4
Social and health impact assessments in EIA

Background and rationale

Social and health impact assessments undertaken comprehensively are crucial to ensure that the process of development is not placing an additional burden on the people, especially women, the poor and the already disadvantaged. In the country, the social and health components are among the weakest in the practice of EIAs. To amend the situation, emphasis firstly, needs to be placed on the inclusion of social issues in the overall planning of any project. Secondly, need for participation of all interested and affected parties in the decision making process to ensure socially compatible development. Thirdly, EIA conducting agencies and institutions should have the required skills to conduct social and health assessments. Fourthly, as social and health impacts of projects can occur long after a project is completed, monitoring of the project through its lifetime becomes necessary.

Objectives

UNDP's programmes in this field should aim towards:

- bridging the existing gaps in undertaking comprehensive environmental assessments through creating greater awareness about the importance of social and health issues
- promote training in social and health assessments
- formulate guidelines\checklists that could form the basis of EIAs.

Specific activities

- *Support to review the scope of EIAs in India*

  Conduct 10 nationwide workshops on the topic of widening the scope of the term "environment" from merely dealing with the biophysical environment (as it is today), to a broader concept that includes the social, health, cultural, historical and political components as an integral part of the environment.

  Aim: To encourage awareness/interaction/debate among various members of the intelligentsia - academia, interested individuals, institutions, and government working in the field of planning, policy and environmental protection on the relevance of widening the terminology. Result of these workshops should be provided to the relevant ministries and planning bodies to implement in the future planning and assessment of future projects.

  Coordinating Agency: Ministry of Environment and Forests

Implementing Agency: NGOs that have a wide network throughout the country and have previous experiences in organising workshops.

- *Capacity building*

1. Promote capacity building through extensive nation-wide training programmes for EIA consultants, project proponents, and research organisations undertaking EIAs to include in their assessment, the project's impact on the social environment. This will require that training and information be provided on aspects such as:
   - problem definition
   - survey methodologies
   - impact modeling and prediction
   - participatory assessments
   - integrating social and health assessments with the other components of EIA
   - management plans for controlling undesirable social impacts (welfare and human resource development).

   Aim: To ensure that the future EIAs are conducted comprehensively. Additionally, as training will be given to select individuals in an organisation, emphasis must be placed on the trainees continuing the process of forwarding knowledge gained through the project to other members of their organisation. This will assist in building on the existing skills of project assessment in the country.

   Coordinating Agency: Ministry of Environment and Forests

   Implementing Institutes: PRIA, Tata Institute of Social Sciences, Foundation for Research in Community Health, TERI, VHAI, All India Women's Conference

2. Training of officers of the Impact Assessment division of MoEF in the evaluation and scrutiny of social and health impact assessment reports.

- *Proactive research*

Identification of a **comprehensive list of social and health characteristics** which must be addressed in an EIA. Existing large scale projects that have resulted in extensive social impacts (large dams, mine areas, creation of nature reserves, major transportation networks, etc.) could be used as case studies to develop this list. Involvement of the affected community must be mandatory in assisting with the identification of the social issues. Development of sector and region specific manuals.

Aim: Although different projects impact differently on the people, the presence of a set of social characteristics will serve as a checklist for identification of social impacts to be considered in a SIA and EIA. The list will prove a valuable document to the impact assessor to ensure an extensive assessment of a project.

The list of social characteristics could then be used to identify **key social and health indicators**. The project should try and quantify these indicators (i.e. a population of 1000 people should have "x" number of schools available to them). For the purpose of identification and quantification of social indicators, the study should analyse specific successes and failures of various projects. Results of which can be discussed in workshops involving all parties dealing with social issues.

Aim: Quantification of social and health indicators will ensure availability of norms that can be applied in various instances dealing with the existing social conditions of a community and possible alterations. Also, quantified social indicators will assist in formulating comprehensive rehabilitation plans for projects. The final product could be in a form of a booklet which can be available to those interested.

Coordinating Agency: Ministry of Environment and Forests

Implementing Agency: Tata Institute of Social Sciences, Indian Social Institute, Institute of Economic Growth, Centre for Social Medicine, JNU

- *Pilot studies*
  Development of baseline identification systems – the development of indicators, their testing and maintenance of databases. In chosen areas/communities indicators may be developed, data on these collected regularly over a 5 year plan, and the changes in these observed as a function of development activities will occur during these years.

- Development of India specific manuals on approaches to participatory implementation, monitoring and evaluation.

Which SHD processes does this support?

Sustainable Human Development processes supported by this sub-programme

- Sustainable economic growth
- People centred approach
- Involvement of multiple stakeholders

Which NEAP issue does this reflect?

- Strengthening the scientific understanding of environmental issues to undertake comprehensive Environmental Impact Assessments in the country.

Which government programme/plan is this similar to?

- Environmental Impact Assessment

Which key management strategy does this addressed?

- The programme is a path to achieving informed decision making at the planning stage of projects.
- The programme also advocates a move towards greater local participation thus the decentralisation of the planning process.

Costs

- US$ 7.5 million

Links with other suggested sub-programmes

- State, district, and city level status of environment reports
- Environmental valuation and accounting
- Regional master plans
- Environmental management plans
- Slum environment improvement programmes
- Bottom-to-top databases and networks

Sub-programme 5
Regional master plans

Background and rationale

Regional assessments look at the environmental impacts of programs, policies, and plans prepared by authorities that have a regional (area-wide) jurisdiction. They also provide a way to assess the cumulative impact of individual projects that have been cleared through an environmental impact assessment (EIA) procedure, or those development activities that currently do not require clearance. When an regional assessment is undertaken, the resulting information can be used to speed up the process of project EIAs (through scoping and easy access to regional information such as baseline/background environment). Such an approach enables the government to fulfill its role as a guide and counsellor. Programs in this category can be associated with GOI's efforts in carrying capacity studies, critical areas action plans, zoning atlas, etc. Linking up the regional master plans with the local activities such as development plans, industrial siting/zoning atlas, land use plans, etc. also forms an important part of formulation and implementation of the regional environmental master plans.

Objectives

- To promote the concept of regional environmental master plans and impart skills to the relevant groups.
- To help develop information and training resources in the area of regional environmental planning

Specific activities

Specific programs which UNDP could consider are;

- Demonstration projects: to prepare a role-model comprehensive master plan of selected regions using best practices (sharing the experiences in developed countries) in assessment and planning, so that neighbouring regions are inspired to do the same. The selected regions could be: coastal, agricultural, industrial, and urban. **One of the selected regions could be what is called a 'backward area', where state governments had granted incentives (such as tax holidays) to industries. The project could then study equity, employment and gender issues as well.**
- Capacity building: To assist programs which aim to impart skills and establish procedures for preparation and implementation of regional environmental master plans.
- Creation of repositories of regional information, including a database of regional environmental information, natural resources status, local development plans, regional master plans and EIAs conducted in the region.

- Development of participatory monitoring and evaluation systems that will enable the Regional Offices of MoEF to ensure that cleared projects fulfill their obligations. Different systems will be needed depending on the dominant sector (mining, power, etc.) in the region.

Coordinating agency

- Ministry of Environment and Forests

Implementing agencies

- State Departments of Environment
- State Pollution Control Boards
- Regional/local development authorities/agencies
- NGOs

Which SHD process does this support?

- Sustainable economic growth
- Involvement of multiple stakeholders
- People centred approach

Which NEAP issues does this reflect?

- Environmental impact assessment - Action to be taken to evolve a network of regional centres in various institutes for training in the preparation of EIAs.

Which government programme/plan is this similar to?

- Environmental impact assessment - Supporting studies on carrying capacity in environmentally fragile or problematic areas.

Which key management strategy does this addressed?

- Facilitating a role for the government that is more proactive, cooperative and guiding
- Formulating appropriate decentralized planning and management practices
- Promoting informed decision making at all levels

Costs

- Approximately US $ 15 million.

Links with other suggested sub-programmes

- State level and district level environmental action programs
- Environmental management plans

Sub-programme 6
Planning of new industrial estates

Background and rationale

Planning the industrial estates in an environmentally benign manner is an essential requirement to enable sustainable management of the estate after the industries are fully developed and are in operation. The grouping of various industries to minimize the resources usage, least damage to the ecosystems with maximum output and minimum waste generation forms an important principle in achieving the goal of sustainable development. Further, planning and implementation of the industrial estates should be in harmony with the existing development plans and environmental plans (state and district/local level). Industrial estate planning involves:

- siting (using the criteria of: environment, resources, energy, and social considerations). **Social considerations are crucial in the case of small units, in terms of human settlements, labor welfare, employment, traditional occupational patterns, etc.**
- assessment of the impact of expansion activities of the industrial estate as a whole (in the regional framework described in another sub-programme).
- regular short-term and long-term management and monitoring of the industrial estate

So far this concept has not been applied in India. Of course, a beginning has been made in the field of zoning atlas. However, in the light of the goal of sustainable development, the need for environmentally compatible planning of industrial estates can not be overemphasized.

It is known that **Agenda 21** (chapter 29) places much emphasis on the **participation of trade unions and the work force** in matters related to **sustainable development**. Specifically, section 29.7 of Agenda 21 suggests tri-partite management of Safety, Health, and Environment programmes, as well as the involvement of women. Worker participation in environmental audits is suggested in section 21.11b of the agenda.

Objectives

- To develop approaches and methodologies for industrial estates planning and to assist the capacity building of associated groups.

Specific activities

Recommended programs in this category are:

- Case studies: A few proposed industrial estates (in selected states) may be taken up for planning exercise. CPCB/SPCBs could provide inputs regarding environmental criteria, while NGOs, local authorities and researchers would be involved in assessing and planning for the social considerations. The plans developed could be demonstrated and disseminated widely amongst the various agencies involved in the process. The demonstration projects could consider proposed homogenous and heterogenous clusters.

- Develop manuals for industrial estate planning, environmental management of industrial estates, methods of impact assessment in industrial estates and monitoring practices.
- Undertake case studies that look at the role of cooperatives (formed by individual units of the estates), partnerships between industrial estate managers and the units/cooperatives. Experiences from developed/other countries could be illustrated to inform/disseminate the best practices.
- Equipping the estate managers with tools and skills so that they may offer subsidized/inexpensive environmental services to their members (monitoring auditing, advice on good house keeping measures, technology selection, EMS, etc.). **Another possible service estate mangers could offer small units is related to occupational heath. Region and sector specific occupational health and safety plans laid down by the cooperatives/estate managers could be monitored through participatory monitoring and evaluation methods. The monitoring committees must include women's organizations. One of the chosen estates could be of the type where women are employed to a large extent because of the type of units planned to be located in the estate. Such approaches may necessitate a review of Industrial Safety enactments.**
- Pilot projects to promote Business-NGO partnerships within the estates, along the lines of the US-AEP programme.

Coordinating agencies

- Ministry of Environment and Forests
- Ministry of Industry
- Ministry of Labour

Implementing institutes

- State Industrial Development Corporations
- State PCBs
- Urban development authorities and Town and Country Planning Organizations
- Industrial cooperatives
- Trade unions
- NGOs

Which SHD process does this support?

- Sustainable economic growth
- Involvement of multiple stakeholders
- Employment
- Women's advancement

Which NEAP issue does this reflect?

- Urban environmental management

Which government programme/plan is this similar to?

- Zoning Atlas

Which Key management strategy does this address?

- Facilitating a role for the government that is more proactive, cooperative and guiding.
- Decentralized planning

Costs

- US $ 25 million.

Links with other suggested programs

- Industrial ecology
- Environmental management systems (EMS)
- Environmental considerations in district and city planning

Sub-programme 7
Capacity building in development ministries

Background and rationale

Currently development projects undergo an EIA much after the detailed project report is ready and the site has been selected. Often, construction has commenced while the EIA/EMP is being prepared. This goes against the basic principles of EIA – such as consideration of alternatives. Part of this problem may be attributed to the lack of capacity in development ministries in evaluating the environmental consequences of alternatives. Ministries that undertake many large projects specially need to undertake the tasks of initial screening, scoping, and site selection (environmental considerations) on their own. The detailed scoping, screening, and other components of an EIA may be undertaken by consultants or approved agencies, as is being done presently.

More importantly, ministries should be in a position to identify the environmental consequences of their policies and programmes and not just that of specific projects. There is also a need to incorporate environmental considerations in projects/actions that do not require formal clearances.

Ideally, there should be an environmental cell in all ministries that have a development objective (coal, power, agriculture, surface transport). Such a measure would help in:

- sensitizing the administrators to environmental imperatives; internalizing and institutionalizing environmental parameters in their programmes
- incorporating environmental objectives not just at the time of project inception, but even at the programme level.
- efficiently and quickly discharging their legal obligations, thus preventing delays in clearance
- creating a proactive approach in case of projects and programmes that do not require formal clearance.

Objectives

- To support development ministries in their efforts to internalize and institutionalize environmental considerations and obligations.

Specific activities

UNDP's programmes could focus on:

- Capacity building, in terms of providing management tools (hardware and software), and training in a three-tier approach:
  - sensitizing programmes (policy formulation) for upper level administrators
  - short-term training in strategies for middle level administrators

  - long-term training for lower level administrators in aspects such as site selection, initial screening and scoping.

  Needless to say, the training would also stress on methods by which public participation is meaningfully ensured in line with GOI policies.

- Information networking between ministries (sharing of data and experiences)
- Capacity building in the Planning Commission, with a view to harmonizing the goals of various ministries in the environmental context.
- Training middle level officers in formulating and preparing projects that can be funded by the GEF.
- Focused, structured, need based training of newly recruited officers. The training should be of the hands-on type through workbooks/manuals on specific topics for 2-3 weeks duration. UNDP could support the preparation of such training materials.
- **Support to the Department of Women and Child in awareness programmes for pollution related problems that affect women. Specifically, the programmes could aim to train officers of this department on environmental risk communication tools.**

Coordinating agency

- Planning Commission
- Ministry of Environment and Forests

Implementing institutes

- Development ministries

Which SHD processes does this support?

- Sustainable economic growth
- Protection of environment.

Which NEAP issue does this reflect?

- Environmental training

Which government programme/plan is this similar to?

- It is not known if similar programmes exist

Which key management strategy does this address?

- Proactive role for the government
- Environmental management of the public sector and government projects
- Assessment of the environmental consequences of economic reforms and restructuring

Costs

- US$ 2 million

Links with other suggested sub-programmes

- Regional master plans
- Development of economic instruments

Sub-programme 8
Training and orientation programme for decision makers

Background and rationale

While environmental planning and management is a critical goal, it is imperative to have support for the concept at the policy making level which often determines the budgetary allocations, institutional mechanisms, etc. Therefore, it is important to sensitize the policy makers at the national and state level, and also international donors on the challenges encountered in the design of sustainable development policies in the midst of the countervailing pressures of economic growth and the need to maintain environmental quality and social equity. Also, in the context of economic liberalisation, it is important to include the private sector, too, which could play a critical role in the developmental process. In addition, it is also necessary to consider the cross-cutting issues enunciated in Agenda-21, and bring a multi-sectoral approach to such training and orientation programmes.

Objectives

To sensitize the policy makers on the environmental issues and facilitate an informed decision making process incorporating sustainable development goals. The main objectives of the programme are:

- To provide participants with an in-depth understanding of and analytical skills for the design and implementation of sustainable development policies, programmes, and practices.
- To develop and disseminate concepts of sustainable development that are sensitive to the needs of the country.
- To create leadership in the government, the corporate sector, NGOs, and community-based organizations to promote sustainable development goals.
- To establish linkages between the participating institutions and programme participants in order to facilitate ongoing collaboration on problems of sustainable development.

Specific activities

An annual training programme of 10-12 weeks duration spread over a year targetting mid-level government officials at the central and state levels, research and academic institutions, NGOs, media and corporate managers. In addition, some participants from selected Asian countries may also be included. The training components involve:

- Initial training focussing on principles and methods of sustainable development management, whereby the participants are exposed to issues and concerns relating to sustainable development.
- This is followed by a project work requirement on a particular sustainable development problem faced by each of the participants in their respective work areas and design of strategies to solve the same by incorporating sustainable development management tools.
- Finally participants work towards the operationalization of their projects and submit reports which are subject to rigorous evaluation. Rounding off lectures by eminent and distinguish policy makers and experts in the field of sustainable development can be arranged in the concluding phase.
- Follow-up conferences are organized and effective networking arrangements established to facilitate exchange of information related to sustainability issues and the current activity of the participants.

Implementing institutes

- NGOs/Research Institutes

Which SHD processes does this support?

- Sustainable economic growth
- Protection of environment.

Which NEAP issue does this reflect?

- Environmental training and awareness

Which key management strategy does this address?

- Proactive role for the government and private sector
- Environmental management of the development/industrial proposals
- Promotion of the concept of sustainable development

Costs

- US$ 750,000

Links with other suggested sub-programmes

- Capacity building in development ministries

Sub-programme 9
Agricultural eco-systems

I Participatory Management of Agricultural ecosystems

Background and rationale

There has been a realization that agro-ecosystems at a village level need to be managed by villagers themselves. The complete exclusion of the users of natural resources of an agro-ecosystem from environmental policy making has led to their alienation from the ecosystems itself, with little or no incentive in natural resource management. It is in this context of "putting people first" that greater decentralization and people's participation in natural resource management has come to the forefront of environmental policy setting. This throws up a large number of areas for intervention in the realm of agro-ecosystem management.

One such opportunity for greater people's participation in agricultural ecosystem management is offered through the Panchayati Raj institutions. The 73rd Amendment to the Constitution has made the election of village Panchayats and Nagar Palikas mandatory. On the one hand, village Panchayats have been found to be particularly ineffective as agents of managing natural resources (CSE, 1989). At the same time. it is argued that while the ownership and management of Village resources have been handed over to village Panchayats, this has not been accompanied by appropriate devolution of financial and other powers (Saleth, 1996).

Objectives

There is a need, therefore, to examine what further legislative and policy changes need to be put in place to make village panchayats more effective agents and catalysts of environmental change. There is need for supporting research that gives fresh insights into what mix of centralization and decentralization is needed to make village Panchayats effective agents for environmental change by facilitating decentralized planning of village eco-systems.

Specific Activities

- Policy Research/Participatory Research

Such research may envisage the following phases

Phase I: A review of existing literature, law and provisions on Panchayati Raj institutions and interaction with experts in the realm of environmental law and participatory rural development.

Phase II: A selection of some village Panchayats for analysis of past experience and record of management of village resources and agro-ecosystems; identification of successes and failures; study and analysis of constraints and factors influencing past success and failure in management of village level resources. This research should be carried out using techniques of participatory rural appraisal.

Phase III: Synthesis of elements of commonality and divergence influencing success and failure in management of agro-ecosystems by village Panchayats.

Expected outputs from this research: Research should lead to new insights into:

- policy and legislative changes needed to empower village Panchayats to manage village resources
- the mix of decentralization and centralization that is needed to enable village Panchayats to effectively undertake the formation of integrated village resource management plans

Coordinating Agency

- Ministry of Rural Development

Implementing Agencies

- Institute of Rural Management (IRMA), Anand
- Indian Institute of Public Administration, New Delhi (Possibly)

Which SHD processed does this support?

- People Centred Approach; Protection of Environment
- Involvement of multiple stake holders

Which NEAP Issues does this reflect?

- Afforestation, Wasteland Development Conservation of Soil and moisture and ensuring that water sources are not polluted.

Which government programme/plan is this similar to?

- Programmes emphasizing people's participation, the thrust of the government on strengthening Panchayati Raj Institutions

Which key management strategies does this address?

- Formulating appropriate decentralized planning and management practices
- Public participation in decision making
- Unifying and rationalising the legal framework
- Formulating a role for the government that is more proactive, cooperative and guiding as against the current regulatory role that it is associated with

Costs

- US$ 5 million

Links with other suggested sub-programmes

- State level status of environment reports
- Bottom-to-top networks

II Women's involvement in agricultural eco-system management and impact assessment of environmental degradation on women

Background and rationale

Women have been involved in the collection and use of natural resources such as water, fuel, fodder and timber; yet they have been completely marginalised from the process of policy-making in the management of these natural sources. Past efforts at providing rural drinking water, for instance, have failed largely because they ignored the needs and practices of women who procure it for the household (Venkateshan, 1995).

There is therefore, a need for a greater understanding of the links between natural resources in an eco-system and women who interact with them. Further, programmes aimed at greater involvement of women in management of agricultural eco-systems should contribute not only to better management of natural resources in the agro-ecosystem, but at the same time facilitate greater empowerment of women with other incidental effects on women's status and well-being.

Furthermore, within agricultural ecosystems, the impacts of environmental degradation are borne disproportionately by women. The impacts of reduced availability of water, forests, fuelwood and timber are felt in terms of the increased time spent by women on collecting them. Further, the reduced availability of fuelwood causes a switch to inferior sources of fuel, which, on burning, produce deleterious effects on the health and productivity of women.

Objectives

- Thus, there is a strong rationale for supporting interventions that lead to a better understanding of the impact of environmental deterioration in agricultural eco-systems on women, greater participation of women in environmental decision-making and women's traditional knowledge in manage~~ment of agricultural~~ eco-systems.

Specific Activities

Capacity building of NGOs in the following areas:

- Establishing mechanisms to assess the impact of environmental and developmental programmes on women

- Developing gender sensitive databases on women's knowledge of natural resource management and on the linkages between gender, environment and development

Coordinating Agency

- Ministry of Rural Development

Implementing Institutes

At present, there is a large number of organizations, particularly in the NGO sector engaged in the task of local level interventions in supporting, designing and organizing women's groups for natural resource management in various parts of the country. A number of local level initiatives in natural resource management involving women have been initiated by organizations like Manodaya in Sitapur District, UP, Aditi in Dumka district, Bihar, Mahiti in Gujarat, and Bharati Women's Development Center, Thanjavur, in Tamil Nadu.

Which SHD processes does this support?

- People centred approach
- Women's advancement
- Protection of the environment

Which NEAP issue does this reflect?

- Afforestation, Wasteland Development Conservation of Soil and moisture and ensuring that Water Sources are not polluted.

Which government programme/plan is this similar to?

State level programmes such as those involving women's role in water resource management such as SWACH in Rajasthan and the Kerala Rural Water Supply and Sanitation Project in Kerala

Which key management strategy does this address?

- Promoting informed decision-making at all levels
- Formulating appropriate decentralized planning and management practices, public participation in decision-making

Costs

- US$ 2.5 million

Links with other suggested sub-programmes

- State level status of environment reports
- Bottom-to-top networks

Sub-programme 10
Development of economic instruments

Background and rationale

Economic Instruments (EI) for environmental management aim at 'internalizing' environmental costs and benefits and thereby seek to induce a change towards environmentally sustainable behavior amongst economic agents like industries. Typically therefore, society would subsidize the producers of 'new renewable[1]' energy for the benefit of incremental environmental cost not incurred by them in the generation of electric power. Contrarily polluting industries would be taxed for the environmental costs associated with their production. EI are distinguished from more traditional "command and control" measures by the fact that EI impose no physical controls on emissions and effluents. They can be categorized under the following heads:

- Incentives to preserve environmental quality like subsidies, grants. low cost loans, preferential import regimes. This category is the most frequently used EI in India. The subsidies available for renewable power equipment, preferential import tax regimes for pollution control equipment, Income Tax rebates under Section 35 CCB for expenditures on natural resource conservation and accelerated depreciation of 100% for pollution and energy conservation equipment are all examples
- Disincentives to avoid environmental degradation and constrain aggregate pollution levels within predetermined limits. Also termed as Market Based Instruments (MBI) these include effluent and emissions charges, pollution taxes, tradable permits, resource user charges. This set of measures is under used in India. The only MBI currently in use in India is the Water Cess imposed by the Water (Prevention and Control of Pollution) Cess Act 1974. However the nominal nature of this levy and the fact that it is charged on the use and not on the pollution of water classifies it more as a revenue generation mechanism rather than a agent for behavioral change.
- Evaluation techniques to assess the cost benefit of environmental regulations. There is as yet no formal mechanism for the inclusion of such techniques compulsorily into the decision making process[2].

The use of economic instruments (EI) for management of the environment is most often cited in the context of 1.2 above, where EI disincentives replace traditional

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'New Renewable' is a subset which excludes large hydro power and nuclear power from the larger set of technologies under 'Renewable' energy.

The Government of India has however constituted a Task Force to Evaluate Market Based Instruments for Industrial Pollution Abatement in the Ministry of Environment and Forests in 1995. The report is awaited.

"command and control" (CC) measures on the grounds that EI's are more efficient than the traditional CC type of regulatory tools. The basis for their perceived higher efficiency is three fold:

- EI's discriminate between polluters on the basis of their efficiency. When emission standards are introduced, under a CC regime, all producers, either have to stop non conforming production, incur abatement costs or cut back production. This can affect individual output since producers with abatement costs lower than the pollution tax would become more competitive than those with higher abatement costs. Consequently the more efficient producers would expand production to meet the gap created by the exit of the outpriced inefficient producers. Similarly products with high abatement costs would be outpriced by those with lower abatement costs.
- MBI avoid the inefficiencies associated with the rationing of the right to pollute. Where a 'global' emission norm has been specified, pollution permits can be allocated to individual polluters. Under a CC framework these would be rationed, thereby incurring the economic costs associated with administrative intervention. Under a MBI based pollution control framework these permits could be auctioned, ensuring thereby, that only the most efficient polluters survive (The highest bidders will be polluters with the highest profit margins and those with the highest marginal abatement costs) while simultaneously generating revenue to compensate those affected by the ensuing pollution.
- MBI's permit the adoption of economy wide least cost abatement options through the facility of 'tradable pollution permits' where the polluter with the lowest marginal abatement cost controls emissions on behalf of other polluters with a higher abatement cost through a bilateral commercial contract.

EI like subsidies have traditionally been used to induce a change in environmental behavior. However the more significant and under exploited potential exists in their capacity to determine the economic efficiency of regulatory measures like emission standards. Abatement measures have an economic cost just as the avoided pollution has an economic benefit. Economic efficiency lies in implementing abatement measures only till the point that the benefits are equal to the costs thereof. Continued abatement beyond this level is economically inefficient. The value of subjecting proposed environmental regulations to the discipline of economic analysis has been recognized in the United States, where Executive Order 12291 of 1981 requires cost benefit analysis of all proposed regulations.

The rationale for intervention

EI have been estimated to be upto twenty times as cost effective as compared to the CC type of regulation in the US. However the effective use of EI necessitates the existence of a well documented data base on the inputs which are used to monetise environmental costs and benefits. Such a data base does not currently exist in India. Considerable institutional strengthening will also be required to disseminate the use of EI and for the creation of the necessary minimum conditions for their widespread adoption as a policy formulation and regulatory tool. Environmental economics is a relatively new entrant in the range of economic disciplines. Legislative changes would also be needed to facilitate the use of EI as a regulatory tool. The existing accounting practices of companies also do not facilitate the analysis of environmental cost benefit in Industry. Consequently external intervention is needed to remove the existing barriers and induce appropriate initiatives amongst the existing stakeholders; Central and State Governments, Industries, Consumers, NGO's and concerned Research Institutions. This defines the need for UNDP assistance.

Objectives

Given below are the objectives that should guide UNDP development assistance:

- Strengthening of the database for estimating abatement cost and benefits.
- Regulated public access to the database.
- Institutional capacity building for the practical application of Environmental Economics to policy formulation.
- Promotion of fora for the effective networking of stakeholders, information sharing, community participation and consensus building.
- Integration of EI into the legislative and administrative framework for environmental management.
- Introduction of environmental criterion in the devolution and decentralisation of public financial resources.

Specific activities

- Database Development:
- *Incremental Abatement Costs:* The CPCB has identified 17 major industries as the most polluting industries. Consequently the cost of abatement measures can usefully be studied initially in these. The availability of such industry sector, size class, and location specific cost functions would plug the existing gap in evaluating the incremental costs of controlling the major industrial pollutants. Research Institutions like IEG, IGIDR, TERI, NEERI, NPC, NIPFP should be sponsored to study the marginal cost of abatement and develop abatement cost functions for these industries in collaboration with FICCI and CII.

Epidemiological studies & Damage Costs: The bulk of the costs of pollution are borne by human beings in terms of increased morbidity, loss of wages, heightened physical and mental stress and mortality. Also termed as 'Health Costs' these are the most significant environmental costs. As conservatively estimated by back-of-the-envelope methods, Health Costs account for more than 60% of the total costs from environmental degradation in India. Preventable mortality in thirty six Indian cities if WHO standards of air quality are met has been estimated at 40,000 with an estimated value of between $170 to 1615 million[3]. However all these estimates use dose response functions from developed countries. The objective conditions of nutrition, standards of living and health are vastly different in India. Consequently the valuation of health impacts become inexact. Consequently a program of epidemiological studies to develop local dose response functions and the income, age, **gender**, occupation based location specific health cost functions of different air and water pollutants would fill a critical research gap in India.

- *Accounting Framework for Industries:* Environmental costs and benefits are not internalized into the existing accounting framework of industries. Since many pollution control measures are also efficiency enhancing "win" measures it is reasonable to expect that net incremental abatement costs would be lower once the efficiency enhancing impact is factored in. The 'greening of company ledgers' or the process wise allocation of environmental costs and benefits requires changes in accounting practices and may require the installation of additional hardware. The GOI in it's Policy Statement for Abatement of Pollution 1992 provides for the submission of Environmental Statements by all industries which at a later stage would get converted into a requirement of statutory Environmental Audit. However the level of compliance is not known. Using the 17 most polluting industries as our base it is proposed that UNDP should sponsor one " Participatory Action Research" in each industry sector to estimate the feasibility of implementing an ongoing environmental accounting system.

Public Access to Data & Wide Dissemination of Information.

Four National Level seminars are proposed on current issues and the prospects of valuing environmental costs and benefits in Delhi, Bombay,

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World Bank *India's Environment: Taking stock of plans, programs and priorities.* January 1996.

Calcutta and Madras. The topic for each seminar has been chosen keeping in view regional priorities and concerns:

Delhi	Health Impacts of Air Pollution
Bombay	Abatement Costs in Industry
Madras	Health Impacts of Water Pollution
Calcutta	Environmental Accounting Systems for Industry

These seminars would provide the fora for dissemination of the findings of the research carried out by the designated institutes under the UNDP program, stimulate informed debate on these issues and provide a fora for public debate on the use of this research in policy implementation.

- Incorporating Economic Instruments into the Legislative and Regulatory Framework.

  Enabling amendments to the existing body of legislation and regulation would be required to integrate the use of economic instruments into the existing framework of regulation. This would require a cross country analysis of the existing provisions, a review of their functioning, the applicability of such provisions to India and a compilation of the legislative and regulatory changes required in the existing body of legislation and regulation.

  The 73rd and 74th Constitutional amendments in 1992 have recommended the decentralization of select environmental responsibilities to the local bodies and Village Panchayats. Simultaneously the State Finance Commissions have to recommend the devolution of finances to these sub state administrative levels. Extensive research is required in the following area:

  - Efficiency and equity impacts of incorporating environmental considerations as a criterion for the transfer of finances from the Center to the States and from the States to Local Bodies and Village Panchayats.
  - A third aspect of incorporating EI's into the decision making framework in India would be to demonstrate the economic efficiency of adopting EI in specific instances. This initiative would involve supporting a set of policy studies which would compare the cost benefit of CC type of regulation with an EI approach. Sequentially these could only be undertaken once localised cost and benefit functions, for selected industries and 'hot spots', have been formulated. Suggested areas of study could be the following:

  - Introduction of unleaded petrol and lowering the sulphur content in diesel; a comparative CB analysis of CC and EI approaches.
  - Cleaning up the Taj; A comparative CB analysis of CC and EI approaches.(A multisectoral environmental management project is also being considered by the ADB.)

  - River Conservation; A comparative CB analysis of CC and EI approaches.
- A national level seminar would provide the fora for presentation of the policy related studies outlined above. The seminar would focus on issues concerning the environmental effectiveness, economic efficiency and equity of economic instruments in managing the environment. This seminar would also define a national agenda for the incorporation of EI in the existing framework of environmental legislation and regulation. Since the objective of the seminar would be to determine the instrumentalities for incorporating EI into decision making, it would ensure wide participation of the stakeholders; Politicians, Central and State Government Officials. NGO's, Industry, Local Bodies, Multilateral and Bilateral Donors and Aid Agencies.

Coordinating agency

- Ministry of Environment & Forests

Implementing institutes

- CPCB, SPCB's, CSO, Dept. of Statistics, Dept. of Industrial Development, Dept. of Revenue, Department of Economic Affairs
- Research organizations: NIPFP, IGIDR, IEG, TERI, MIDS, MSE
- Industries associations: CII, FIICI

Which SHD processes does this support?

- Sustainable economic growth
- Protection of the environment

Which NEAP issue does this reflect?

- Scientific understanding of the environment

Which government programme/plan is this similar to?

- It is not known whether similar programmes exist.

Which key management strategy does this address?

- Formulating appropriate decentralized management practices
- Use of economic instruments

Costs

- US$ 10 million

Links with other suggested sub-programmes

- Environmental valuation and accounting

Sub-programme 11
Environmental Management Plans

Background and rationale

Projects that are subject to EIA are often cleared with conditionalities related to EMP. However, all institutions (including consultants) are found to be weak in designing and implementing the EMPs. The major gaps in this direction are: lack of proper methodological and best practices manuals/guidelines, lack of proper support and enforcement of EMPs.

Objectives

- To support design and implementation of appropriate and successful EMPs.

Specific activities

UNDP's programme could extend help in:

- **Developing detailed guidelines** on EMP design and implementation. These could be separate manuals on various aspects that will provide information on:
  - preparation of appropriate EMPs for various projects
  - EMP implementation mechanisms/practices
  - post project assessment methods
  - Periodical review and feedback on EMPs
- **Creating Centres of Excellence, within existing institutes,** in EMP design. These centres would:
  - provide information on successful practices in other countries
  - serve as learning centres to practising professionals
  - assist project proponents in designing appropriate and feasible EMPs
  - assist project proponents to implement, through a participatory methods, the EMPs

Such centres would specially be useful in areas such as rehabilitation plans, compensatory afforestation, green belts, land reclamation, ecosystem regeneration. Given the nature of these plans these centres should be based in NGOs or CBOs. Typically, the approved consultants existing today who assist project proponents in preparing EMPs are more proficient in control and preventive technologies.

Coordinating agency

- Ministry of Environment and Forests

Implementing agencies

- Central Pollution Control Board
- State Pollution Control Board
- Respective industries/companies
- NGOs

Which SHD processes does this support?

- Sustainable economic growth
- Participation of multiple stakeholders
- Transfer of technology
- Protection of environment

Which NEAP issue does this reflect?

- Action would be taken to establish a national centre for long term training in EIA/EMP.

Which government programme/plan is this similar to?

- Environmental Impact Assessment - monitoring the performance of stipulated EIA conditions

Which key management strategy does this address?

- Facilitating a role for the government that is more proactive, cooperative and guiding.
- Environmental management of the public sector and infrastructure projects

Costs

- US$ 10 million.

Links with other suggested sub-programmes

- Regional master plans

Sub-programme 12

Environmental Management Systems in industry

Background and rationale

The rapid growth of national environment statutes, international treaties and conventions has put tremendous pressures on industries to reduce pollution and the subsequent environmental harm. Consumers are demanding information about the environmental effects of the products and are preferentially purchasing those marketed as environmentally friendly. Performance auditing alone cannot guarantee continual improvement in environmental performance. Often environmental audit results are not integrated with other operation aspects of the company's activities. By implementing EMS, the required integration between the environmental aspects and other functions can be achieved. An EMS is defined as the organisational structure, responsibilities, practices, processes and resources for implementing and maintaining environmental management. At the factory level the EMS results in:

- motivation of staff and improved work environment
- improved compliance rates
- adoption of clean technologies in order to go beyond regulatory requirements
- BS7750/ISO14000 certification, thus leading to export competitiveness
- improved relationships with regulatory authorities
- reduction in exposure to legal risks and ethical criticism
- improved customers relations and image
- energy and raw material conservation and thereby higher profitability

At national level EMS results in :

- reduction in burden of regulatory agencies
- reduction in cost of monitoring
- development of indigenous and clean technologies

Objectives

- Dissemination of the benefits of EMS to industrialists, decision makers, scientific communities and the public
- Motivation of industries to adopt EMS
- Creating a task force which can assist industries in adopting EMS

Specific Activities

- Preparation of a database and industry specific guidance manuals.
- Capacity building

  A series of seminars and workshops on specific industrial sectors should be organised. Industries which are accredited EMS certificate can demonstrate the benefits of EMS.

- Training of environmental managers and auditors
  At present very few organisations are capable of assisting industries in the adoption of EMS. Thus, it will help in creating a task force who can assist industries to adopt EMS. Thus, the dependance on external agency will reduce
- Establishing industry and environment centres in various parts of the country which will facilitate the exchange of information to industries. The success achieved by an individual unit will have a multiplier effect.

Coordinating agency

- Ministry of Environment and Forests; State Pollution Control Boards

Implementing institutes

- CII, New Delhi, National Productivity Council
- Centre for Environmental Sciences (CES), Anna University, Madras

Which SHD processes does this support?

- Sustainable economic growth
- Transfer of technology
- Protection of Environment

Which NEAP issue does this reflect?

- Improving access to clean technologies
- Training programmes to create environmental awareness and to provide training on environmental matters.

Which government programme/plan is this similar to?

- Developing assistance programs in other areas of industrial environmental management

Which key management strategy does this address?

- Facilitating a role for the government that is more proactive, cooperative and guiding.

Costs

- US$ 5 million

Links with other suggested sub-programmes

- Planning of industrial estates

Sub-programme 13
Coastal environment management

Background and rationale

Coastal waters are being polluted due to activities such as industrial and municipal wastewater discharges, operation of oil tankers as well as the movement of mechanized fishing vessels. The coral reefs, mangrove ecosystems are being damaged/exploited. These issues are of great concern and are reflected in GOI's notification on Coastal Regulation Zone (CRZ). The notification has imposed restrictions on the setting up and expansion of industries, operations or processes in the coastal zone. However, preparing comprehensive coastal environmental management plans taking into account the problems of concern and best practices for implementing the various schemes, needs considerable help and support from experiences in other parts of the world. There is a need to tackle coastal issues through proper regulatory and management approaches.

Objectives

- To help develop approaches for coastal environment management and implementation practices.

Specific activities

UNDP's programs could:

- Support the coastal states (including Lakshadweep and Andaman & Nicobar Islands) in preparing Coastal Zone Management Plans as required by the CRZ notification. This could particularly include a comprehensive approach in developing the plans with a view to tackle specific issues and draw-up measures (using information on best practices in other parts of the world) for effective safeguard and protection/management of the coastal areas.
- Support preparation of detailed EIA guidelines for coastal and offshore development projects (including ports and harbors, beaches and tourism projects) together with implementation strategies for the coastal management plans.
- Support studies to assess the extent of damage caused to various coastal ecosystems and prepare mitigation plans for specific problem areas of immediate concern.
- Support coastal resources monitoring systems including fish resources monitoring programs in the coastal parts by involving CBS (**including women's organizations**).
- Assist municipalities (in coastal belts) in sewage treatment and disposal.

Coordinating agency

- Department of Ocean Development
- Ministry of Environment and Forests

Implementing institutes

- Departments concerned in State Governments
- NGOs
- Universities

Which SHD process does this support?

- Sustainable economic development
- Involvement of multiple stakeholders
- Protection of the environment

Which NEAP issue does this reflect?

- Conservation education on wetlands, mangroves and coral-reefs.

Which government programme/plan is this similar to?

- Conservation of natural resources - formulation and approval to management action plans for different wetlands/mangroves and coral reefs in the different parts of India.

Which key management strategy does this address?

- Formulating appropriate decentralized planning and management practices
- Promoting informed decision making at all levels

Costs

- US $ 25 million.

Links with other suggested sub-programmes

- Environmental considerations in district and city planning
- Environmental management plans
- Regional master plans

Sub-programme 14
Industrial ecology

Background and rationale

One of the goals of the development is to provide services with minimum consumption of energy and raw materials. Therefore, it is important to device methods of reusing waste as a secondary raw material. Recovery of waste products of an industrial production process is a feasible method for avoiding both pollution and excessive waste treatment costs. Often this procedure is not used because it usually means no work for an industry outside the normal flow of production for profits. Therefore, the ultimate solution of industrial pollution problem is the one utilising environmentally optimised industrial complexes. These complexes should be designed to contain a number of compatible industrial plants, practising reuse and recirculation of all residues.

Industrial ecology refers to exchange of materials and energy in industrial systems. As an example, the waste of one industry may be a raw material for another industry (or industries) adjacent to it.

Objectives

- Reorganisation of industrial production system to include balanced environmental complexes.
- Promote compatible plants near existing homogenous industrial clusters so that they can use the wastes and no pollutant escapes into the surrounding environment.

Specific activities

- Pilot Projects on multi-industry integrated waste management in industrial estates. In an industrial estate different units can be shown to be exchanging material and energy resources, thus achieving almost zero net pollution and making profits.
- Setting-up regional exchange centres.
  These centres will keep a record of waste producer and users in the region. These centres should also publish information through newsletters. The objective is to identify new outlets for using wastes and saving raw materials.
- Technical support to entrepreneurs who are willing to use hazardous wastes.

Coordinating agency

- CPCB

Implementing Institutes

- CSIR and its laboratories, such as NEERI
- Industrial R&D laboratories
- National Productivity Council
- Trade Organisations

Which SHD processes does this support?

- Sustainable Economic Growth
- Transfer of technology
- Protection of Environment

Which NEAP issue does this reflect?

- Improving access to clean technologies
- Dissemination of wastewater recycling technologies
- Environmental training and awareness

Which government programme/plan is this similar to?

- Waste minimization circles

Which key management strategy does this address?

- Planning at decentralized levels

Costs

- US$ 5 million

Links with other suggested sub-programmes

- Planning of new industrial estates
- Development of fiscal instruments

Sub-programme 15
Slum environment and health improvement programmes

Background and rationale

In India, at the present time there are numerous programmes that deal with the problems of slums. The Ministry of Urban Development has several on-going programmes that address the various issues that plague the slum dwellers. UNDP's role in the context of this should be of complimenting the work that has already been done or planned by the Government of India.

Objectives

The aims of any project dealing with slums should be:

- encourage empowerment and involvement of women in the deciding what are the priority issues of the slum
- utilise existing expertise in slums to implement projects
- encourage appropriate capacity building exercises to increase the existing skills of the population which could provide a source of income generation for the people
- as far as possible all projects undertaken for the improvement of slum conditions should be partly or completely self financed by the inhabitants or the community are least contributing a minimal fee for the use of the facility
- technical inputs wherever necessary must be provided by UNDP or a relevant NGO working with slum issues.

Specific activities

- Community self-help projects: Creation of a demonstration project that deals with **mobilizing the slum dwellers in provision of infrastructure** i.e water, sanitation, and housing in the slum. Implementation of the project will require the participation and assistance of inhabitants, local authorities and NGOs that might already be functioning in the slums. The project should commence with a general awareness programme for the slum inhabitants on health and hygiene. Participation of the community will help ensure that the most pressing concern will be highlighted. The implementing authority in consultation with the community, should then decide on the solution to the problems. Often solutions will require placing infrastructural facilities in the slums. As far as it is feasible, the community must contribute towards the costs either through skills or some monetary help. A representative body of the inhabitants must be created who would be responsible for such issues in the community even after this project is completed.

Aim: To ensure that the slum community through its direct participation in deciding and paying for a particular solution will thus have a sense of ownership to the facility and will work to maintain it. As the project will be largely community driven, it should be able to continue functioning independent of external support.

- Undertake a pilot project that deals with the problem of **waste disposal** in the slums. Most slums suffer from non-collection of garbage by the municipality which leads to heaps of uncollected garbage littering the area resulting in outbreak of numerous diseases. To address the problem the project should target the unemployed youth present in the slums, and involve them in sorting this garbage. The incentive provided to them could be that whatever item they find (i.e. paper, metal, glass, etc) which has resale value can be sold by them and the money retained. Suggestion for the organic wastes which often contributes to the bulk of the waste could be of composting once all the waste is sorted out. The slum community could designate a spot for composting. Composting could be done naturally or through vermicomposting. Any compost generated would be theirs to sell. The project could be designed so that participatory monitoring and evaluation is possible.

  Aim: Ensure that the slums are kept clean and the unemployed youth are provided a means of earning an income.
- **Capacity building** in the urban local bodies on methods of encouraging a participatory approach to any project in the slums. Provide information about how different slum related problems are being solved in different parts of the country and internationally. Training must also be provided to members of the National Training Institute, State Training Institute and Field Training Institute as they are the implementing agencies for many of the slum development projects undertaken by the government. Lack of skills and knowledge at the implementing level has been responsible for many of the failures in previous slum improvement schemes.

  Aim: Improve efficiency in implementing projects at the community level.
- **Participatory action research**

  Sustainable solutions to the following problems may be possible through action research:
  - Toxic pollution in slums located in industrial areas (Mumbai/Calcutta)

- **Water quality and health – this is a problem that affects women more than men (Chennai)**
- **Combustion of low-grade fuels and its impact on the health of women and children, feasibility of alternative sources of energy (Delhi)**
- **Health of rag-pickers – many of whom are women (Delhi)**
- **Health of women who work in factories and reside in slums** (Ahmedabad)

The emphasis here is on rigourously quantifying the links between pollution and health and then seeking appropriate cost-effective solutions that satisfy the principles of sustainable development: participatory, cross-sectoral, equity, etc. The interventions could have elements of: private contracting, planning manuals, community self-help, demonstrations of new technology, innovative financing, etc.

Coordinating Agency

- Ministry of Urban Development

Implementing Institutes

- Municipalities, TCPOs, NGOs. Projects may be linked to WHO's Healthy Cities Project.

Which SHD processes does this support?

Sustainable Human Development processes supported by this sub-programme

- People centred approach
- Poverty Alleviation
- Advancement of women
- Income generating activities

Which NEAP issue does this reflect?

- The programme is in line with the emphasis that NEAP places on the problems of the urban environment.

Which government programme/plan is this similar to?

- Slum Environment Improvement.

Which key management strategy does this address?

- Decentralised planning and management
- Public participation in decision making
- Valuation and risk assessments

Costs

- US$ 30 million

Links with other suggested sub-programmes

- State, district, and city level status of environment reports
- Environmental considerations in district and city planning
- Planning of new industrial estates

Sub-programme 16

Network of accredited laboratories

Background and rationale

The need for many sophisticated laboratories spread across the country is driven by two factors:

- The rapid growth in the number of industries that are legally obliged to undertake EIA, audits, compliance etc.
- The severe paucity of reliable data, specially on toxic pollution. This implies that our knowledge of the status of the environment, source apportionment, and cause-effect links is very weak.

Objectives

- To support capacity building in government laboratories, universities and the private sector.

Specific activities

- Training of manpower, specially in quality control and assurance, so that these laboratories could be eligible for ISO certification.
- Facilitating information networking and inter-laboratory comparisons. Such networks could also **serve the judiciary** as independent investigating agencies.
- Regular skills upgrading programmes.
- Support to a national facility that offers extension services such as calibration.
- Creation of laboratories that serve as learning centres and are also able to offer inexpensive services.

Coordinating agency

- Council for Scientific and Industrial Research

Implementing institutes

- Government and private laboratories

Which SHD processes does this support?

- Transfer of technology
- Protection of environment.

Which NEAP issue does this reflect?

- Scientific understanding of environmental issues
- Environmental training

Which govt programme/plan is this similar to?

- Environmental research

Which key management strategy does this address?

- Informed decision making

Costs

- US$ 7.5 million

Links with other suggested sub-programmes

- State, district, and city level status of environment reports

Sub-programme 17
Bottom-to-top networks

Background and rationale

Like all developing countries India faces some of the common problems of low awareness to value of information, low motivation for exchange of information, low capacity to invest. poor communication linkages, absence of streamlined process for acquisition of documents and inadequate manpower of the required type, etc. Existing networks have a top-to-bottom approach and often data are not available at the national level. Hence there is a need to establish a networking system which can assist in collection of data at the grassroots level.

There are 5.76 lakh villages and about 1 lakh Panchayati Raj units in India. These units can become the 4th level in the hierarchy for information collection and compilation at the grassroots level. There is a need for some basic infrastructure in the form of books, reports and other training materials. Before such a programme takes of, it is imperative to decide on:

- the kind of information required at the village level which would be the baseline data to help in assessing the state of India's environment and that would help in formulating future plans in right perspective and;
- the mode of data collection.

Objectives

- To pilot a bottom-to-top network through Panchayati Raj units.

Specific activities

- Identify voluntary organizations and NGOs at the grassroots level. who will collect information and data and convey these to the ENVIS centres or identified NGOs at the National level or SDNP institutes (which are around 8). These data will be available at the national and eventually at the international level (with Internet connection).
- ENVIS is already involved in networking and though they only have E-mail connection presently, they will have the INTERNET connection shortly. Since projects of other international agencies are already taking care of the infrastructure for strengthening the ENVIS centres, there will only be a need to provide basic infrastructure at the newly appointed NGOs at the grassroots level.
- The demonstration projects can be undertaken in 5 - 10 districts, going down to about 400-500 villages in one state. After a pilot test this can be modified and replicated in other states.
- If the project is successful in one village then the acceptance level is high.

Coordinating agency

- Ministry of Rural Development

Implementing institutes

- NGOs, NICNET, Centre for Media Studies

Which SHD processes does this support?

- People centred approach
- Informed decision making

Which NEAP issue does this reflect?

- Creation of environmental awareness

Which government programme/plan is this similar to?

- ENVIS

Which key management strategy does this address?

- Formulating appropriate decentralized planning and management practices.
- Public Participation in decision making.

Costs

- US$ 2.5 million

Links with other suggested sub-programmes

- State, district, and city level status of the environment report
- Environmental considerations in district and city planning
- Regional master plans
- Higher education in environmental sciences, engineering, and management
- Legal literacy

Sub-programme 18
Higher education in environmental sciences, engineering, and management

Background and rationale

Environment knowledge in traditional societies is the result of a close relationship with the environment. But in the modern and traditional societies impacted by rapid modernization, environmental education requires institutional efforts to impart awareness and skills that used to be an integral part of the traditional education process. The level of cultural diversity in India contributes to the need for flexible, location specific environmental education.

The policy regarding environmental education states that within the reorientation on the educational process there exists the paramount need to create a consciousness of the environment that must permeate all ages and sections of the society. Considerable work has been done to incorporate environment education at the school level.

There has been an increase in the level of environmental education at the university level. Environmental science is a commonly offered course in universities including technical institutions. The infusion method has been unsuccessful at the university level. The environment courses tend to be fragmented, resulting in graduates with little background in the range of economic, scientific, and social concerns relating to the environment. Also the human dimension in the ecological courses is conspicuous by its total absence. One reason for the limited number of interdisciplinary environmental courses and programs at the university level is the lack of links between the universities and the employers.

The World Bank proposes to build the capacity of selected universities in environmental law and economics.

Objectives

- To support the internalization of environment education at higher levels in all disciplines and upgrade specialized environmental courses.

Specific activities

- Support a course (through curriculum development, teacher training, and providing equipment) which tries to integrate the human dimension in the ecological perspective for very specific environmental issues, having a direct relevance on Indian ecological problems. **This linkage can be used for the sustainable development in the region.**

  The proposed course should be an intensive, specialized course at various levels (Ph.D., M.Phil, Post P.G. level in the form of a one year diploma) , for a definite time frame preferably for a 3 year period. Faculty could be from within the department of the university, 3-4 professors to form the core faculty. Visiting faculty could be invited from various other institutes, professors from universities on one year tenure. A specific select target group would be selected such as Ph.D. students, researchers, and in service candidates. Maximum of 10 students should be taken on a fellowship programme. Training should supplement the knowledge that already exists. The course's continuation should depend on evaluation reports of whether its working as well as envisaged. Support could also be for fellowships.

- Infuse environmental studies as an integral component within various technical courses such as engineering, management, medicine, etc.

  Environment as a course, should be integrated within the regular subject areas to give a holistic view to all professionals in diverse areas of work. For B.Ed. and M.Ed. courses one subject should definitely be on environment as teachers have a wide spectra of society that they can reach. This should be completely a need based programme for a highly selective group as whenever there is a problem there is greater motivation to solve it rather than solving it at an abstract level.

  Support could be given for curriculum development and teacher training.

- Setting up Centres of Advanced Studies dedicated to work in research and training.

  Universities should develop Centres for Advanced Studies. which would be dedicated to working in research and training in higher education. Problems which have a direct relevance to Indian ecology, flora, fauna, society, culture and environment should be addressed by these centres. Two issues of such direct relevance are:

  - Rehabilitation of degraded rural systems.
    Rationale: As rural set up is totally neglected in India. Important issues can be in terms of land management, sustainable agricultural system, and ecological and economic system.
  - Biodiversity and natural resources management in the South and South Asian region.
    Rationale: Not only does India enjoy a major leverage in ecological environmental context, it also represent one of the hotspot region in biodiversity. Research and development could focus on the traditional societies (tribals and non-tribals) which could include Kumaon - Garhwal, Himachal and Sikkim; the whole Himalayan range.

- Creating (in existing universities) and providing regional centres with sophisticated equipment, software. Information Technologies (e.g. GIS) to be used for teaching and research in higher level degree courses.

- Upgrading facilities in existing courses.
- Support for establishing courses oriented towards planning, management, and policy. For example:

  Women's universities:

  - **Women and environment in SNDT University, Mumbai**
  - **Women and community health in P M V University, Andhra Pradesh**
  - **Environmental awareness in Mother Teresa University, Tamil Nadu**

  Other universities:

  - Rural energy and environment, IRMA, Anand
  - Corporate environmental management in IIMs
  - Risk assessment in IITs

Coordinating agency

- Ministry of Human Resource Development and University Grants Commission.

Implementing institutes

- Universities

Which SHD processes does this support?

- Capacity building; Women's advancement

Which NEAP issue does this reflect?

- Environmental education

Which government programme/plan is this similar to?

- Environment education in schools

Which key management strategy does this address?

- Promoting informed decision making at all levels.

Costs

- US$ 15 million

Links with other suggested sub-programmes

- Legal literacy
- Network of accredited laboratories

Sub-programme 19
Legal literacy

Background and rationale

India is one those few countries that has included in its Constitution the provision for the protection of the environment. Despite this and numerous legislation that exist on protecting the environment there has been little success till now on enforcing the word of the law in the country.

Objectives

The programme aims to:

- improve the meaningfulness and efficiency of the Public Interest Litigation process
- encourage capacity building on existing legislation
- review judicial effectiveness.

Specific activities

- Conducting **nationwide workshops and seminars** for capacity building through training on existing environmental legislation of the country is necessary among bureaucrats and members of NGOs to ensure that the decision makers have some degree of understanding legal provisions made for the protection of the environment. There should be special emphasis on the subject of "rights of individuals" as often lack of information about these rights has led to considerable number of malpractices being overlooked or accepted.
- **Research activities**
    - Critically assess existing and any new environmental legislation that are in the pipeline, e.g. Draft Rehabilitation Policy,. Draft bill on New Forest Policy and recommend possible improvements.
    - Review of the information policy in the environment sector
- Technical and scientific support to:
    - NGOs and women's organizations (including training in accessing information databases such as SDNP, ENVIS, etc.)
    - Principal benches under National Environmental Tribunal Act '95
    - Judiciary

Coordinating agency

- Ministry of Environment and Forests

Implementing Institutions

- Centre for Environmental Law, WWF

Which SHD processes does this support?

- People centred approach

Which NEAP issue does this reflect?

- The programme will play a complimentary role to NEAP's look at India's legal and organisational framework for environmental management.

Which government programme/plan is this similar to?

- Strengthening the enactments

Which key management strategy does this address?

- Rationalizing and unifying the legal framework

Costs

- US$ 2 million

Links with other suggested sub-programmes

- Social and health impact assessments in EIA
- Environmental management plans
- Coastal environment management
- Bottom-to-top databases and network

Sub-programmes analysis

Table 3 Extent to which selected programmes would contribute to UNDP's goals

Programme	UNDP goals			
	Poverty alleviation	Advancement of women and children	Productive employment	Protection of the environment
State -of- the environment reports at the state, district, and city levels		✓		✓
Environmental considerations in district and city planning		✓		✓
Environmental valuation and accounting		✓		✓
Social and health impact assessments in EIA	✓	✓	✓	✓
Regional master plans		✓		✓
Planning of new industrial estates	✓	✓	✓	✓
Capacity building in development ministries				✓
Training and orientation programme for decision makers				✓
Agricultural ecosystems	✓	✓	✓	✓
Development of economic instruments				✓
Environmental management plans	✓	✓		✓
Environmental management systems in industry				✓
Coastal environment management	✓	✓		✓
Industrial ecology				✓
Slum environment improvement programmes	✓	✓	✓	✓
Network of accredited laboratories				✓
Bottom-to-top information database and network		✓		✓
Higher education in environmental sciences, engineering, and management		✓		✓
Legal literacy		✓		✓

Table 4 Extent to which selected programmes would be able to follow SHD processes

Programme	SHD processes					
	People centred approach	Sustainable economic growth	Involvement of multiple stakeholders	Transfer of technologies	Informed decision making	Cross-sectoral links
State- of-the environment reports at the state, district, and city levels	✔✔		✔✔✔		✔✔✔	✔✔
Environmental considerations in district and city planning	✔✔	✔	✔✔✔		✔✔✔	✔✔✔
Environmental valuation and accounting	✔	✔✔	✔✔		✔✔✔	✔
Social and health impact assessments in EIA	✔✔✔	✔✔✔	✔✔✔		✔✔✔	✔✔
Regional master plans	✔✔	✔✔✔	✔✔✔		✔✔	✔✔✔
Planning of new industrial estates	✔✔✔	✔✔	✔✔✔		✔	✔✔✔
Capacity building in development ministries	✔	✔✔✔	✔✔✔		✔✔	✔✔✔
Training and orientation programme for decision makers	✔	✔✔✔	✔✔		✔✔	✔✔✔
Agricultural ecosystems	✔✔✔	✔✔✔	✔✔✔		✔✔	✔✔✔
Development of economic instruments	✔	✔✔	✔		✔✔	✔✔✔
Environmental management plans	✔✔	✔✔	✔✔✔		✔✔	✔✔✔
Environmental management systems in industry	✔	✔✔	✔	✔✔✔	✔	✔✔✔
Coastal environment management	✔✔	✔✔	✔✔✔		✔✔	✔✔
Industrial ecology	✔	✔✔	✔	✔✔✔	✔	✔
Slum environment improvement programmes	✔✔✔	✔✔	✔✔✔		✔✔	✔✔✔
Network of accredited laboratories			✔	✔	✔✔✔	✔
Bottom-to-top information database and network	✔✔✔	✔	✔✔✔		✔✔✔	✔✔
Higher education in environmental sciences, engineering, and management	✔		✔		✔✔✔	
Legal literacy	✔		✔		✔✔✔	

Table 5 Extent to which selected programmes would be able to contribute to India specific needs

Programme	Other criteria				
	Relevance to NEAP	Cost-effectiveness	Promoting decentralized planning	Proactive and guiding role for government	Capacity building
State-of-the environment reports at the state, district, and city levels	✓✓	✓	✓✓✓	✓	✓✓
Environmental considerations in district and city planning	✓✓	✓	✓✓✓	✓	✓✓
Environmental valuation and accounting	✓✓✓	✓	✓✓	✓✓	✓✓✓
Social impact assessments	✓✓	✓	✓✓✓	✓✓	✓✓✓
Regional master plans	✓✓	✓	✓✓✓	✓✓✓	✓✓✓
Planning of new industrial estates	✓	✓	✓✓✓	✓✓✓	✓✓✓
Capacity building in development ministries	✓	✓✓	✓✓	✓✓	✓✓✓
Training and orientation programme for decision makers	✓✓✓	✓✓	✓	✓✓	✓✓✓
Agricultural ecosystems	✓✓	✓✓✓	✓✓✓	✓✓	✓✓✓
Development of fiscal instruments	✓✓✓	✓	✓	✓✓	✓✓✓
Environmental management plans	✓✓	✓✓	✓✓	✓	✓✓
Environmental management systems in industry	✓	✓	✓	✓✓	✓
Coastal environment management	✓✓	✓✓	✓✓	✓	✓✓
Industrial ecology	✓	✓	✓	✓	✓✓
Slum environment improvement programmes	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Network of accredited laboratories	✓	✓	✓✓	✓	✓✓
Bottom-to-top information database and network	✓✓✓	✓	✓✓✓	✓	✓✓✓
Higher education in environmental sciences, engineering, and management	✓	✓	✓	✓	✓✓✓
Legal literacy	✓	✓	✓	✓✓	✓✓

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Abbreviations

ADB	Asian Development Bank
AEP	Asia Environment Programme
BF	Blast Furnace
BOD	Biological Oxygen Demand
CBO	Community Based Organization
CCB	Command and Control Based
CES	Centre for Environment Studies
CII	Confederation of Indian Industry
CMIE	Centre for Monitoring the Indian Economy
CPCB	Central Pollution Control Board
CRZ	Coastal Regulation Zone
CSE	Centre for Science and Environment
CSIR	Council for Scientific and Industrial Research
CSO	Central Statistical Organization
DANIDA	Danish International Development Agency
EI	Economic Instruments
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Management Systems
ENVIS	Environmental Information System
EPCO	Environment Protection Coordination Organization
FICCI	Federation of Indian Chambers of Commerce and Industry
GEF	Global Environment Facility
GIS	Geographical Information System
GOI	Government of India
ICAR	Indian Council of Agricultural Research
IEG	Institute of Economic Growth
IGIDR	Indira Gandhi Institute for Development Research
IIM	Indian Institute of Management
IIT	Indian Institute of Technology
IRMA	Institute for Rural Management, Anand
ISO	Indian Statistical Organization
JNU	Jawaharlal Nehru University
MBI	Market Based Instruments
MHFW	Ministry of Health and Family Welfare
MIDS	Madras Institute of Development Studies
MINARS	Monitoring of Indian National Aquatic Resources System
MoEF	Ministry of Environment and Forests
MPN	Most Probable number
MSE	Madras School of Economics
MSW	Municipal Solid Wastes
NAAQM	National Ambient Air Quality Monitoring
NEERI	National Environmental Engineering Research Institute
NGO	Non-governmental Organization
NIPFP	National Institute for Public Finance and Policy
NORAD	Norwegian Development Agency
NPC	National Productivity Council
ODA	Overseas Development Agency
OECF	Overseas Economic Cooperation Fund

PCB	Pollution Control Board
PRIA	Participatory Research in Asia
SACEP	South Asia Cooperative for Environment Protection
SDC	Swiss Development Cooperation
SDNP	Sustainable Development Network Programme
SHD	Sustainable Human Development
SIA	Social Impact Assessment
SIDA	Swedish International Development Agency
SPCB	State Pollution Control Board
SPM	Suspended Particulate Matter
TCPD	Town and Country Planning Department
TCPO	Town and Country Planning Organization
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
VHAI	Voluntary Health Association of India
WWF	World Wide Fund for Nature